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1871 - 1876.

PROVINCE OF ONTARIO.

EXAMINATIONS FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

No. 1.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. Explain fully how to state and solve a question in simple proportion. A grocer sells $14\frac{7}{16}$ oz. for a lb., how much does he cheat a customer who buys to the amount of $73·92?

2. Give ex. of the difference between Simple and Compound Practice. Convert £296 16s. $10\frac{3}{4}$d. sterling into Canada currency. The £ being worth $\$4·86\frac{2}{3}$.

3. What vulgar fractions will produce finite decimals, and why? Reduce to a decimal $\dfrac{\frac{2}{5}-\frac{1}{20}}{\frac{2}{5}} \times \dfrac{(8\frac{4}{7})^2}{12} + \left\{(1+\tfrac{1}{10}) \div (\tfrac{3}{2}+\tfrac{1}{14})\right\} + \dfrac{22\frac{3}{16}}{17\frac{3}{4}}$

4. A and B can do a work in 7 days, B and C in 8 days, and A and C in 9 days; in what time will (1) each separately, (2) altogether, do the work?

5. Explain fully the terms Numerator and Denominator. Prove that both terms of a fraction can be multiplied or divided by the same number without changing the value of the fraction. Examine whether the common definition of multiplication holds in the case of fractions.

6. Examine the different cases of profit and loss. A merchant asked 30 % advance on cost of goods, but finally took 30 % less than price asked; how much did he gain or lose %?

7. Show how to find the present worth of a debt payable at a future time without interest. I have 2500 bls. of flour for sale and am offered $6·30 cash, or $6·55 on eight months. How much shall I gain by accepting the better offer, money being worth $8\frac{1}{2}$ %?

8. Define insurance, policy, premium. A person insured a house for $\frac{4}{5}$ its value at $1\frac{1}{4}$ % annually; after paying 6 premiums the house was destroyed, the entire loss being $1945. Find value of house.

9. The police returns for a certain year give 1350 male offenders, and 1150 female; the next year's returns show a decrease of 5·4 % in the number of male criminals, and an increase of 8·4 % in number of female. Find increase or decrease % in whole number of criminals.

10. A board is 3 feet wide and six feet long, find its area; show clearly that your multiplier is not concrete. Find cost of carpeting a room 22 feet 6 inches long by 17 feet 9 inches wide; the carpet being 27 inches wide and $1·60 a yard.

11. The sides of a right angled triangle are 30 feet and 40 feet respectively, find the perpendicular from the right angle upon the hypotenuse.

12. It is required to lay out 70 acres, 3 roods, $26\frac{3}{4}$ perches of land in the form of a rectangle whose length shall be three times the breadth. Find the dimensions.

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COMMENCING 25th JULY, 1871.

No. 2.

BOOK-KEEPING.

TIME—ONE HOUR AND A HALF.

1. Describe the Cash Book, Journal, Ledger and Invoice Book.

2. You commence business with $5,000 cash, and $5,000 goods purchased from A.B. at 6 months. Shew what accounts you would open.

2. What accounts would be effected, and how, by the following entries:

   (1) Sold goods to A. on account, $500.
   (2) Sold goods to B. to the amount of $1,000, receiving $600 cash and his note at 4 months, payable at Bank of Toronto.
   (3) Bought goods from C., $1,600, paying $900 cash and giving my note at 4 months, payable at Bank of Commerce.
   (4) Had B.'s note discounted at Bank of Toronto at 8 per cent.
   (5) Received a legacy of $800.

4. What is the object of the Profit and Loss account? When do you debit and when credit it?

5. Describe the steps you would take in closing a set of books.

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EXAMINATIONS FOR SECOND PROVINCIAL AND THIRD CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

No. 3.

ETYMOLOGY.

TIME—ONE HOUR AND A HALF.

NOTE.—Candidates for Third Class Certificates will answer the first seven questions of this paper; and it is recommended to the local examiners that the per centage of marks necessary in order that a candidate may pass, be taken on the value of these questions diminished by the marks assigned to questions 6 and 7. Candidates for Second Class Certificates will omit 5, 6 and 7, and answer the remainder of the Third Class Paper, together with their own special paper; and it is recommended that the per centage of marks necessary in order that a candidate may be ranked of a certain grade, be taken on the value of this work, diminished by the number of marks assigned to questions 12 and 13.

1. In what cases is the final consonant doubled before an affix?

2. In the following words mark the accented syllable:—Advertisement, elegiac, opinionative, empyrean, sonorous, monosyllabic, anathema, mausoleum, horizon, diocesan.

3. Correct, where necessary, the spelling of the following:—Seperate, harrassing, embarrassing, parallelogram, chicanery, belief, Hugenot, receive, abstruce, abscind, impune, inveagle, rhapsody, pthisic.

4. Mention prefixes, each in combination with some word, which denote rest and motion *in* time and place.

5. Give words in which the following affixes appear, and state the force of each affix:—"ism," "ling," "all," "ster," "ness," "acy," "ure."

6. Trace to their national origin:—Admiral, turban, scimitar, muslin, sago, sonnet, gazette, divan.

7. Derive the following:—Chimney, fascine, acoustics, vicissitude, gormandize, exaggerate, truth, forfeit, copse, synod.

ADDITIONAL FOR SECOND CLASS CANDIDATES.

8. In the following groups of verbs of similar signification, indicate the appropriate use of each verb:—Esteem, estimate, appreciate; grant, allow, bestow, concede; build, erect, construct; usurp, arrogate, assume.

9. Give words of Latin and English origin corresponding with the following:—Apology, catalogue, democracy, eulogise, mystery, prophesy, sympathy.

10. Mention words—two in each case—derived from these Latin roots:—Arceo, caro, colo (are), falx, fiscus, gelu, grex, orior, sinus, tueor.

11. Trace the following to Greek roots:—Disastrous, autocratic, epidemic, analyse, amnesty, optics, oxygen, frantic, empyreal, isothermal, polygon, system.

12. What do you understand by the "imperfect incorporation" of words introduced from a foreign language? State the principles which characterise it, and give examples.

13. (*a*) Explain the term "Hybridism," and illustrate by examples.

    (*b*) Show that *icicle* is hybrid in appearance only.

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EXAMINATION FOR SECOND PROVINCIAL AND THIRD CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

NO. 4.

HISTORY.

Candidates for Third Class Certificates may omit all the questions under V., VI., VII., X. and XI.

TIME—THREE HOURS.

I. (1.) When does the history of the Jews first come into contact with that of Egypt?

(2.) To which of the Persian monarchs is the name Ahasuerus applied in various parts of Scripture History?

(3.) (*a.*) To what countries did the missionary labors of St. Paul extend?
(*b.*) How was his life closed?

II. (1.) (*a.*) Of what party amongst the Athenians was Pericles the representative?
(*b.*) Who was his rival?
(*c.*) Give the date of his administration, and describe its effect on the prosperity of Athens.

(2.) (*a.*) Who were the "Thirty Tyrants?" By whom were they deposed?

III. (1.) What efforts were made to restore the Tarquins?

(2.) (*a.*) What event gave rise to the 2nd Punic War.
(*b.*) Enumerate Hannibal's victories.

IV. (1.) (*a.*) Who was Clovis?
(*b.*) What name has been given to the dynasty founded by him?

(2.) What speculation in the reign of Louis XV. caused great excitement in France, and brought thousands to ruin?

(3.) With what event may the French Revolution be said to have commenced?

V. In what battle were the fortunes of Charles XII., of Sweden, ruined?

VI. (*a.*) In what contest did William of Orange, surnamed "the Silent," render himself conspicuous?
(*b.*) Mention the leading incidents, and state the result of that contest.

VII. (1.) State the circumstances which incited the American colonists to commence the War of Independence.

(2.) (*a.*) Under whose administration, and in what manner, was Louisiana acquired?
(*b.*) What was the extent of Louisiana at that time?

VIII. (1.) Compare the claims of the Houses of York and Lancaster to the throne of England.

(2.) When was the first Reform Bill passed? What extension of the franchise did it effect?

IX. (1.) State the circumstances under which the first expedition of Jacques Cartier was undertaken.

(2.) How did the "seignorial tenure" originate?

X. (1.) Describe the manner in which the First Partition of Poland was accomplished, and its effects. Date?

(2.) (*a.*) How did Napoleon, after the battle of Marengo, testify his desire to conciliate Russia?
(*b.*) What motive had he in so doing?
(*c.*) What led Alexander I. to declare war against him?
(3.) In what connexion do we find the collision between the *Leopard* and the *Chesapeake*?

XI. (1.) Give the date of General Braddock's expedition, describe its disastrous result, and state the cause of his failure.

(2.) During what period was the Earl of Elgin Governor-General of Canada? Sketch his career.

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COMMENCING 25th JULY, 1871.

No. 6.

GEOGRAPHY.

TIME—THREE HOURS.

This Paper, as far as question 12, is intended for candidates both of the Second and Third Class. In regard to the latter the Paper may be considered a full one without 2 and 10, and the local examiners are requested to exclude the marks assigned to those two questions from the total on which they are to calculate the percentage prescribed by the Department. Candidates for a Second-Class Certificate may omit 4, 5, and 10, and the remainder, together with their own special Paper, may be considered a full Paper.

1. Define Meridian; Tropics; Horizon (Sensible and Rational); Ecliptic; Zodiac; Oasis; Estuary; Delta.

2. Express in the most exact shape the conclusion arrived at with reference to the form of the earth, and show how this is established by different admeasurements of the length of a degree on the same meridian.

3. Where are the following metals found in greatest abundance,—Gold; Silver; Iron; Copper; Lead; Quicksilver?

4. Classify the different races of mankind, naming the divisions of the world where they are chiefly found, and giving, as nearly as you can, the total number of each class.

5. Give a list of the Third and Fourth Rate Powers of Europe, with their capitals.

6. Into what bodies of water do the following rivers discharge themselves,—Oder; Ebro; Po; Petchora; Dniester; Shannon; Obi; Congo; Euphrates; Amoor.

7. State accurately the position of the following:—Astrakhan; Gothland; Archangel; The Naze; Lake Itasca; Paramaribo; Buda; Strait of Yenikale; Coquimbo; Minsk; Sitka; Dijon; Tornea; Cape Matapan; Rio Janeiro; San Luis Potosi.

8. What Mountains between Europe and Asia? What Provinces South of Hungary? What Austrian Town at the head of the Adriatic? What Cape in South part of Sicily? What large Island near the mouth of the Orinoco? What Province S. W. of Brazil? What City of South America on the Equator? What islands E. of N. America in lat. 40° N.? What State N. of Kansas? What Strait between Cape Breton and Nova Scotia? What river flows from Lake Simcoe into the Georgian Bay?

9. What countries of South America lie wholly, or in part, South of the Tropic of Capricorn?

10. Arrange in groups the Rivers of North America.

11. What mountain-ranges on the lower St. Lawrence?

12. Draw a map of Nova Scotia, Cape Breton, and Prince Edward Island, indicating with care the boundaries, and marking leading places as far as time may allow.

Additional for Second Class.

13. Specify the great River Basins of Asia.

14. Enumerate the Colonial possessions of Holland.

15. Name the Presidencies of British India, with their principal divisions and chief cities.

16. Trace the course of the Ottawa, naming its tributaries and bordering counties on the Ontario side.

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COMMENCING 25th JULY, 1871.

No. 7.

ENGLISH GRAMMAR.

TIME—TWO HOURS AND A HALF.

Note.—Candidates for third class certificates will answer the first twelve questions of this paper; and it is recommended to the local examiners that the per centage of marks, necessary in order that a candidate may pass be taken on the value of these questions diminished by the number of marks assigned to questions 9 and 10. Candidates for a second class certificate will omit 2, 7, 8, and 10, and the analysis in 12, and will answer the remainder of the third class paper, together with their own special paper; and it is recommended that the per centage of marks necessary in order that a candidate may be ranked of a certain grade, be taken on the whole value of this work, diminished by the number of marks assigned to questions 13 and 14.

1. Define Abstract Noun; Person; Relative Pronoun; Impersonal Verb.

2. (*a*) What are the various modes of distinguishing the Masculine and Feminine gender?
   (*b*) Give the feminine of marquis, stag, buck, executor.

3. Write the plural of cargo, canto, tyro, potato, echo, attorney, chimney, criterion, axis, genius, index, aide-de-camp.
4. Explain the inflection *'s* in the Possessive Case.
5. Give examples of the Appositive to the Possessive.
6. How may a Simple Subject be changed into a Complex?
7. In what light may "any" be regarded?
8. Give a list of Comparatives which want the Positive.
9. What rules are laid down to regulate the use of the relative "that."
10. (*a*) Show that Intransitive Verbs are sometimes rendered Transitive.
    (*b*) Give Transitive Verbs corresponding with the following Intransitive forms: Rise, Lie, Sit, Fall.
11. Give the rule for the construction of the Predicate Noun, and state with what verbs it is most frequently connected.
12. Parse the italicized words in the following sentences, and analyze No. 3.
    (1) His *power* and the number of his adherents declining daily, he consented to a partition of the kingdom.
    (2) *To die* with honor is *all* I can now do for my country.
    (3) *It* was proposed to him that, in the absence of all regular authority, he should allow himself to be appointed to the vacant office; but he was wiser than *to undertake* a charge so full of danger, and so likely to prove unavailing at last.
    In the preceding sentence, point out the object of *should allow*.

Additional for Candidates for Second Class Certificate.

13. Investigate the statement that "mine" and "thine" are the possessive case of the Personal Pronoun, whilst "my" and "thy" are the Possessive Adjective.

14. State the rule relating to "sequence of tenses" in connexion with the conjunction "that;" and quote Latham's argument to show that the rule must necessarily be absolute.

15. Illustrate the use of the Adjective in Predicate, and state clearly its force and relation.

16. Examine the correctness of the following, giving in each case your reason for retaining or altering the construction:—
    (*a*) The Prime Minister, with the Chancellor of the Exchequer, were admitted to an audience by the Queen.
    (*b*) It is not fit for such as us to sit with the rulers of the land.—*Sir Walter Scott.*
    (*c*) His Majesty was less daunted than I could expect.—*Dean Swift.*
    (*d*) The Duke of Wellington is not one of those who interferes with matters over which he has no control.—*Wellington.*
    (*e*) He cut his way gallantly through them and came off safe.—*Macaulay.*

17.

1. You may as well go *stand* upon the beach,
2. And bid the main[1] flood bate[2] his usual height;
3. You may as well use question[3] with the wolf,
4. Why he hath made the ewe bleat for the lamb;
5. You may as well forbid the mountain pines
6. To wag their high tops and to make no noise
7. When they are fretted with the gusts[4] of heaven[5];
8. You may as well do anything most hard,
9. As *seek* to soften that—than *which what harder*?—
10. His Jewish heart.

—*Merchant of Venice, Act IV., Scene 1.*

(*a*) Analyze from line 5 to the end.
(*b*) Parse the words in italics.
(*c*) Derive the words which are numbered.
(*d*) In line 6 do you notice any peculiarity?

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No. 8.

EDUCATION.

TIME—TWO HOURS AND A HALF.

1. Discuss briefly the question, What is Education?

2. What basis of classification would you adopt in an ordinary school? What elements besides mere proficiency would you consider?

3. State briefly the utility of Botany as a subject of study in Public Schools.

4. What means would you adopt to secure the interest of your pupils in the work of the school?

5. Give the principal arguments in favor of prizes in schools, and state what means you would adopt to reduce to a minimum the disadvantages of the prize system.

6. Name some of the uses and abuses of the monitorial system. What plan would you adopt in employing monitors in a Public School?

7. Describe how you would teach (1) Dictation; (2) English Grammar to a class of beginners; (3) Algebra.

8. State the Law (*a*) as to to the proceedings to be taken on the formation of a new School Section. (*b*) The principal duties of trustees in Rural Sections.

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COMMENCING 25th JULY, 1871.

NO. 9.

OPTIONAL PAPER FOR SPECIAL CERTIFICATE IN

NATURAL HISTORY, BOTANY, AND AGRICULTURAL CHEMISTRY

TIME—TWO HOURS AND A HALF.

1. How are the Nematoneura distinguished from Acrita? Name their classes.

2. Name the classes of the Heterogangliata and give their leading characteristics.

3. Enumerate the *orders* of the Aves, the *tribes* of the Passeres, and state how the Scansores differ from the other tribes of this order.

4. Name the parts of the pistils and stamens of a flower, and give their uses.

5. What are Perennial plants? Describe their mode of life.

6. "There are two great classes of stems, which differ in the way the woody part is arranged in the cellular tissue." Fully explain this.

7. Describe the functions of the leaves. How are leaves classified as to their *veining?*

8. Name and describe the organic constituents of plants.

9. How can you distinguish the organic from the inorganic constituents of soils, and determine their relative proportions?

10. "All kinds of manure should be under cover,"—explain the reason of this: if exposed to the open air, how would you prevent the escape of valuable fertilizing elements?

11. How may the defects of sandy soils be remedied? Those of argillaceous soils?

12. State the beneficial effects of drainage on soils.

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No. 10.

ALGEBRA.

TIME—TWO HOURS AND A HALF.

1. Simplify the complex fraction $\dfrac{\dfrac{1}{1+a} - \dfrac{1}{1-a}}{\dfrac{1}{1+a} + \dfrac{1}{1-a}}$ (*Text book.*)

2. Resolve $a^{18} - x^{18}$ into its elementary factors. (*Text book.*)

3. Divide by Horner's synthetic method, $6a^4 - a^3 + 2a^2 + 13a + 4$ by $2a^2 - 3a + 4$. (*Text book.*)

4. (*a*) Prove that the L. C. M. of two algebraical expressions is their product divided by their G. C. M. Does this rule hold for more than two expressions? Illustrate.
   (*b*) Find the L. C. M. of $a^3 - 9a^2 + 26a - 24$ and $a^3 - 8a^2 + 19a - 12$. (*Text book.*)

5. Prove that $x^m - 1$ is divisible by $x - 1$ without remainder, m being a whole number.

6. Solve the following equations:
   (*a*) $5m - \dfrac{2x}{3} - \dfrac{5(1-2m)(x-1)}{2} - \dfrac{20mx+1}{4} = 0.$
   (*b*) $\dfrac{5}{x} + \dfrac{12}{y} - 97 = 0$, and, $\dfrac{1}{5x} - \dfrac{1}{12y} = \tfrac{1}{2}.$
   (*c*) $x - y = a,\ x^2 - y^2 = b.$ (*Text book.*)

7. "A certain number of two digits is such that when divided by 4 less than twice the sum of its digits, the quotient is three; but when divided by 5 more than the difference of the digits, the quotient is 13. Required the number, the right hand digit being the greater." (*Text book.*)

8. Two men, A and B, dig a trench in $3\frac{3}{7}$ days. If A were to do more work by one third than he does, and B more work by one half than he does, they would dig the trench in $2\frac{26}{59}$ days. In what time would each dig it alone, at his present rate of work?

9. Prove that when the unequal quantities n and m have the same sign, $\dfrac{m}{n} + \dfrac{n}{m} > 2.$

10. Prove, that in the arithmetical extraction of the square root of a number which is a complete square, after $n + 1$ figures of the root have been obtained by the rule, n more may be obtained by dividing the last remainder by the last trial divisor. (*Text book.*)

NOTE.—It is recommended to the local examiners that the per centage of marks, necessary by the regulations of the Council of Public Instruction in order that a candidate may be ranked of a certain grade, be taken on the whole value of the paper diminished by the number of marks allowed to question (10.)

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No. 11.

NATURAL PHILOSOPHY.

TIME—THREE HOURS.

1. In a straight lever CBA, a weight W of 10 lbs. acts at B, a distance of 5 feet from the fulcrum A; and the power P is applied at C, on the same side of the fulcrum as W, but in an upward direction. If AC be $12\frac{1}{2}$ feet, what is P? And what is the pressure on the fulcrum?

2. Assuming the principle of virtual velocities, deduce therefrom the relation that must subsist between the Power and the Weight in the lever, in order that there may be equilibrium?

*3. At points A, B, C, which are in the same straight line, weights of 8 lbs., 12 lbs., and 20 lbs. respectively, are placed. If AB be $12\frac{1}{2}$ feet, and BC be 5 feet, it is required to find the centre of gravity of the three weights.

4. (*a*) In a system of pullies, where each pully hangs by a separate string, what power will sustain a weight of 104 lbs., there being two movable pullies in the system?

(*b*) If the weight of each of the two pullies be $1\frac{1}{3}$ lbs., by what power will the weight of 104 lbs. be sustained, the weight of the pullies being taken into account?

5. A weight of 80 lbs. is sustained on an inclined plane by a power of 60 lbs., acting parallel to the base. How many feet does the plane rise in the hundred?

6. What pressure will be exerted by a power of 20 lbs., acting on a differential screw, in which the power lever is 50 inches long, the pitch of the exterior screw $\frac{2}{11}$ of and inch, and that of the inner screw $\frac{1}{5}$ of an inch. (Text-book.)

7. What is the amount of pressure exerted against a mill dam, the part submerged being 10 feet wide and 80 feet long, and the depth of the water being 8 feet? (Text-book.)

8. (*a*) What is meant by *uniformly accelerating force?* For instance, g being the force of gravity at the earth's surface, explain the formula, $g=32$.

(*b*) A body is falling to the earth at the earth's surface; what velocity has it acquired after descending for 6 seconds? And though what space does it fall in the succeeding second?

* (*c*) At the surface of a planet, whose mass is such that the force with which bodies at its surface gravitate towards it is only one-fourth of the force of gravity at the earth's surface, a projectile is shot upwards with an initial velocity of 80 feet in the second. How high will it rise?

9. (*a*) Enunciate Boyle's law, determining the relation between the density of a gas and its elasticity.

(*b*) Describe the air-pump.

(*c*) Describe the barometer.

* (*d*) A cylinder whose height is $1\frac{1}{4}$ feet, and the radius of its base 2 feet, contains as much air, as under the ordinary atmospheric pressure, would fill a hollow cube, one of whose edges is $\sqrt[3]{3.1416}$ feet. What is the pressure of the air in the cylinder on a square foot of the surface?

10. (*a*) One end of a uniform beam rests on the ground, the other end being supported in the hand of a man who exerts a pressure which is at right angles to the length of the beam, and in a vertical plane passing through the beam. Mention the different forces by which the beam is kept at rest.

* (*b*) If the weight of the beam be 200 lbs., and its inclination to the ground 60°, what force does the man exert?

NOTE.—It is recommended to the local examiners, that, in the above paper, the percentage of marks necessary, by the regulations of the Council of Public Instruction, in order that a candidate may be ranked of a certain grade, be taken on the full value of the paper, diminished by the number of marks allotted to the questions marked (*).

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No. 12.

CHEMISTRY, BOTANY, AND PHYSIOLOGY.

TIME—TWO HOURS AND A HALF.

1. Distinguish an Elementary *Substance* from a Compound. Describe clearly what is meant by the *combining weights* of the Elements.

2. Give the symbols and combining weights of the fifteen elements which we have mainly to consider in Ag. Chemistry.

3. State and illustrate the law of *multiple proportions.*

4. What is Chemical Nomenclature ? Give the force of the principal prefixes and terminations it employs.

5. State the principal properties of O. What different effects result from the union of O. with metalloids and metals ?

6. Give the leading properties of chlorine. Account for its bleaching and disinfecting powers.

7. State what you know of the following :
   (1) Phosphuretted Hydrogen. (2) Caustic Potash. (3) Hydraulic Cement.

8. Name the organs of reproduction in plants, and describe their functions.

9. Give and fully describe the principal parts of the flower.

10. " In the adaptation of the food to the wants of the body, it is subjected to five different changes." Explain this statement fully.

11. Give the anatomy of the skin. Mention some of the uses of the cuticle.

12. Give briefly the hygiene of the nervous system.

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No. 13.

EUCLID.

TIME—TWO HOURS AND A HALF.

1. If two triangles have two sides of the one equal to two sides of the other, each to each, but the angle contained by the two sides of the one greater than the angle contained by the two sides equal to them, of the other, the base of that which has the greater angle shall be greater than the base of the other.

2. To describe a parallelogram equal to a given rectilineal figure, and having an angle equal to a given rectilineal angle.

3. If a straight line be divided into any two parts, the squares on the whole line, and on one of the parts, are equal to twice the rectangle contained by the whole and that part, together with the square on the other part.

4. To describe a square that shall be equal to a given rectilineal figure.

5. If a straight line touch a circle, and from the point of contact a straight line be drawn cutting the circle, the angles which this line makes with the line touching the circle shall be equal to the angles which are in the alternate segments of the circle.

DEDUCTIONS.

6. If from any point D in $A C$, the base of a triangle A B C, which has the two sides $B A$ and $B C$ equal to one another, $D E$ be let fall perpendicular on $B C$, the angle $A B C$ shall be double of the angle E D C.

7. Straight lines which respectively bisect two opposite angles of a parallelogram are either parallel or coincident.

8. If from B, the vertex of a triangle $A B C$, which has the two sides $A B$ and $B C$ equal to one another, the straight line $B D$, be drawn to a point D in the base $A C$, $A B^2 = B D^2 + A D, D C$.

9. Draw a straight line to touch each of two given circles.

NOTE.—It is recommended to the local examiners, that, in the above paper, the book work and two of the deductions be regarded as a full paper counting 100; and that the per centage of marks, necessary by the regulations of the Council of Public Instruction in order that a candidate be ranked of a certain grade, be taken on the value of the paper thus reduced.

PROVINCE OF ONTARIO.

EXAMINATIONS FOR THIRD CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

No. 14.

ARITHMETIC.

TIME—THREE HOURS

1. Write in figures and expressive words the numbers seven hundred and one units in the 6th period, fourteen in the 5th, one hundred and twenty in the 3rd, fourteen in the 2nd, and nine in the 1st.

2. Shew that the corresponding operation in the simple and the compound rules, are based on the same principles. How many years, months, days, hours and minutes from 20 minutes past 4 o'clock P. M., July 15th, 1862, to 25 minutes past 11 o'clock, June 29th, 1871?

3. State the principles on which is based the rule for finding the G. C. M. of two numbers. Apply them to find that of 3621 and 1581.

4. The driving wheels of a locomotive are $17\frac{1}{2}$ feet in circumference, and the trucks $10\frac{5}{8}$, what distance must the train move to bring wheel and truck into same relative positions as at starting?

5. State the general principles on which the rules of fractions depend; and find simplest form of $(7\frac{3}{4} \div 5\frac{1}{4})$ of $\left\{ (4\frac{1}{2} \times \frac{7}{8}) + 1\frac{3}{5} \right\} \times (3\frac{1}{2} - \frac{9}{10})$.

6. From the sum of $2\frac{19}{24}$ acres, $\frac{2}{3}$ of $3\frac{1}{8}$ acres, $\dfrac{9\frac{1}{2}}{25\frac{1}{3}}$ roods, and $\frac{3}{11}$ of $1\frac{1}{11}$ perches, take 4 acres, 25 perches, 12 square yards.

7. A man divided a farm among three sons; to the first he gave 80 acres, to the second $\frac{4}{9}$ of the whole, and to the third $\frac{3}{4}$ as much as to both the others. How many acres did the farm contain?

8. Find the sum, difference and product of $3{\cdot}45\dot{6}$ and ${\cdot}42\dot{5}$.

9. Find values of 2·7345 according as the unit is £2 5s., or 5 acres, 2 roods, 10 perches, or 6 oz., 10 dwt., 16 grs.

10. Sold 20900 feet of lumber for $\$331{\cdot}62\frac{1}{2}$, gaining thereby $\$78{\cdot}37\frac{1}{2}$. What had it cost per C?

11. Explain the difference between simple and compound proportion. In Nova Scotia the Sovereign is worth $5, and in Ontario $\$4{\cdot}86\frac{2}{3}$; convert, $2720·40 Ontario currency into Nova Scotia currency.

12. (*a*) Received $4100 from my agent, who had deducted his commission at 5 %, as proceeds of sale of goods; what were the goods sold at?

    (*b*) Remitted $4100, including commission, to my agent to invest for me on commission of 5 %: what was his commission?

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EXAMINATIONS FOR THIRD CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

No. 15.

EDUCATION.

TIME—TWO HOURS AND A HALF.

1. What is meant by School Organization ?
2. You take charge of a Rural School of 50 pupils, shew how you would proceed to classify.
3. Construct a Time Table for such a school.
4. Describe how you would proceed with a class beginning the study of Arithmetic.
5. What measures would you take to create an interest in the school throughout the section ?
6. State the leading points of the Law in regard to Public School Teachers and their duties.
7. Describe how you would teach :

   (1) Dictation.

   (2) English Grammar to a class of beginners.

PROVINCE OF ONTARIO.

EXAMINATIONS FOR FIRST CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 1st AUGUST, 1871.

No. 16.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. Find G. C. M. of 8, $4\frac{4}{9}$, $4\frac{4}{5}$, $\frac{4}{45}$, giving reasons for the work.

2. Prove that a vulgar fraction will produce a finite decimal, or a pure circ. decimal, or a mixed circ. decimal, according as its denominator has *only* the factors of 10, none of such factors, *other* factors *also;* and that the number of finite figures will be equal to the greatest number of equal factors, 2 or 5, in the denominator.

3. State the different cases in percentage. To each of a class of 6 pupils 300 questions were proposed ; the 1st answered 275, the 2nd 260, the 3rd 240, the 4th 200, the 5th 210, the 6th 180 ; what was the standing of the class ?

4. In building a house, I paid $2\frac{1}{2}$ times as much for material as for labor; had the latter cost 8% more, and the former 10% more, the whole cost would have been $2872.50 ; find the actual cost.

5. A merchant consigns a quantity of flour to an agent in Montreal, who charges $2\frac{1}{2}$% com. for selling, and $3\frac{1}{2}$% for buying, with instructions to invest the proceeds, (after deducting his commission for both transactions) in certain goods ; the agent sells the flour at $6.25 a bbl., and invests as directed, his entire commission being 434.00\frac{12}{23}$; how many bbls. flour were consigned ?

6. Define the terms Company, Corporation, Charter, Firm, Joint Stock, Scrip. I had $8000 Bank of Toronto stock; when at a premium of 95% a new issue of stock was ordered, giving to each Stockholder at a premium of 5%, half as many shares as he already possessed; the market value of the stock then declined $15\frac{5}{13}$%; How much did I gain or lose by *not* selling out before the new issue?

7. Define the terms Insurance, Underwriter, Policy, Premium. For what sum must I insure property at $1\frac{1}{8}$% to *cover a loss* of $3955 ?

8. Distinguish *ad valorem* and *specific* duties. The duty on certain imported goods at 36% was $198, an allowance of 15% having been made at the Custom House for damage sustained by the goods after shipment. What was the invoice (cost) of goods ?

9. "The course of exchange on England is usually given with reference to the *old par* of exchange." Explain this statement; shew that when sterling money is quoted at $9\frac{1}{2}$% premium, it is really at *par* according to present standard. A Bill of Exchange on Dublin for £720, cost $3472; find the *course of exchange.*

10. What relative quantities of sugar at 7 cents, 8 cents, 11 cents and 14 cents, must be sold to realize an *average* price of 10 cents ? Give *reasons* for your solution.

11. The three sides of a triangle are 30, 40, 48 ; find the segments into which the base is divided by a perpendicular upon it from the vertical angle.

12. If it cost $75 to inclose a circular pond containing 3 A. 2 R. 6 P., how much will it cost to inclose one of 35 A. 1 R. and 20 P. ?

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COMMENCING 1st AUGUST, 1871.

No. 17.

EUCLID.

TIME—THREE HOURS.

1. In obtuse angled triangles, if a perpendicular be drawn from either of the acute angles to the opposite side produced, the square of the side subtending the obtuse angle is greater than the squares of the sides containing the obtuse angle, by twice the rectangle contained by the side on which, when produced, the perpendicular falls, and the straight line intercepted, without the triangle, between the perpendicular and the the obtuse angle.

2. To draw a straight line from a given point, either without or in the circumference, which shall touch a given circle.

3. To inscribe a circle in a given square.

4. In a circle the angle in a semicircle is a right angle ; but the angle in a segment greater than a semicircle is less than a right angle ; and the angle in a segment less than a semicircle is greater than a right angle.

5. If two triangles which have two sides of the one proportional to two sides of the other, be joined at one angle so as to have their homologous sides parallel to one another, the remaining sides shall be in a straight line.

6. To find a mean proportional between two given straight lines.

DEDUCTIONS.

7. Let BAC and DEF be two triangles, which have the sides, AB, AC, equal to ED, EF, each to each, and also the angle ABC equal to the angle EDF. Then, if the angle BAC be not equal to DEF, the angles ACB and EFD shall be together equal to two right angles.

8. Let ACB be a triangle, right-angled at C ; and let $AB = 2AC$. Prove that if the angle BAC be bisected by AD meeting BC in D, $AD = 2DC$.

9. The side BC of a triangle ABC is bisected at D, and the angles ADB, ADC are bisected by the straight lines DE, DF, meeting AB, AC at E, F, respectively. Show that EF is parallel to BC.

10. In any triangle, if b be the base, s the sum of the sides, p the perpendicular let fall upon the base from the opposite angle, and r the radius of the inscribed circle, prove that $b : s :: r : p$.

NOTE.—In the above paper, the book work and two of the deductions will be regarded as a full paper, counting 100 ; and the per centage of marks, necessary by the regulations of the Council of Public Instruction, in order that a candidate be ranked of a certain grade, will be taken on the value of the paper thus reduced.

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No. 18.

ALGEBRA.

TIME—THREE HOURS.

1. Find the G. C. M. of $8a^3b^2 - 24a^2b^3 + 24ab^4 - 8b^5$, and $12a^4 - 24a^3b + 12a^2b^2$. (*Text book.*)

2. Solve the equations—
   (*a*) $3 + 1{\cdot}72x - 2{\cdot}21x = {\cdot}203x$. (*Text book.*)
   (*b*) $x + y = 1,\ x^3 + y^3 = 7$.
   (*c*) $\dfrac{1}{x} + \dfrac{1}{y} = \dfrac{4}{x^2 + y^2},\quad \dfrac{5}{x} - \dfrac{5}{y} = \dfrac{8}{y^2 - x^2}$.

3. "The sum of two fractions is $1\frac{14}{15}$; and the sum of their reciprocals is $2\frac{5}{12}$. What are the two fractions?" (*Text book.*)

4. The distance between *A* and *B* is twelve miles. A traveller sets out from *A* to walk to *B*; and, half an hour afterwards, another starts from *B* to walk to *A*, each proceeding at a uniform pace. They meet at *C*, the middle point between *A* and *B*. The first, after resting at *C* for 10 minutes, proceeds at a rate faster by $\frac{3}{5}$ of a mile per hour than previously, till he reaches *B*. The second waits at *C* for 40 minutes, then goes forward towards *A* at a rate faster by one mile per hour than previously. He reaches *A* at the same time that the first traveller reaches *B*. Find the rates at which the travellers set out from *A* and *B* respectively.

5. (*a*) Investigate a rule for finding the sum of an arithmetical series, whose first term, common difference, and number of terms, are known.
   (*b*) Find the limit to which the sum of the Geometrical series—
   $${\cdot}01 + {\cdot}001 + {\cdot}0001 + \&c.,$$
   approaches, as the number of terms becomes indefinitely great.
   (*c*) There are three numerical quantities in Harmonical Progression; but the series consisting of the first of these quantities, of the second multiplied by $\frac{5}{2}$, and of the third multiplied by 4, is in Geometrical Progression; and the series consisting of the first of the same quantities, of the second increased by $\frac{5}{2}$, and of the third increased by 4, is in Arithmetical Progression. Find the numbers.

6. (*a*) "In how many different ways can six different counters be arranged?" (*Text book.*)
   (*b*) "How many different sums can be formed with a guinea, a half guinea, a crown, a half crown, a shilling, a sixpence, a penny, a half penny, and a farthing?" (*Text book.*)

7. Write down the value of the expression—
   $$(-1)^{-\frac{1+2n}{2}}\ (-1)^{-\frac{2n-1}{2}} + 3(-1)^{\frac{m-1}{2}}\ (-1)^{\frac{1-m}{2}} - 2(-1)^{\frac{1+n}{2}}\ (-1)^{\frac{1-n}{2}}$$
   where *m* and *n* are whole numbers.

8. (*a*) The value of *m* in the quadratic equation, $x^2 + 2mx + n = 0$, being fixed, the roots of the equation are imaginary for every value of *n* betwixt a certain quantity *N* and + *infinity*, but real when *n* either is equal to *N*, or lies between *N* and − *infinity*. What is the value of *N*? And how are the roots related to one another when $n = N$?
   (*b*) If the equations, $x^2 + px + q = 0$, and $x^2 + rx + s = 0$, have a common root, $r - p$ is the difference, and $\frac{q}{s}$ is the quotient of their other roots.

NOTE.—The per centage of marks, necessary, by the regulations of the Council of Public Instruction, in order that a candidate may be ranked of a certain grade, will be taken on the whole value of the paper diminished by the number of marks allowed to question (8).

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COMMENCING 1st AUGUST, 1871.

No. 19.

EDUCATION AND SCHOOL LAW.

TIME—THREE HOURS.

1. Describe a School House for an average attendance of 80 pupils, as to

    (1.) Size, &c.
    (2.) School Furniture and its arrangement.
    (3.) School Apparatus.

2. You are appointed to a school of 300 pupils, how would you proceed to organize it? Give limit tables for each Division.

3. You are placed in charge of a mixed school of 70 pupils, construct a time-table exhibiting the daily work.

4. How would you deal with the following cases?:—

    (1.) Wilful disobedience.
    (2.) Injury to school property.
    (3.) Habitual idleness.
    (4.) Habitual tardiness.

5. Exhibit a form of Monthly Report to parents.

6. State the advantages and disadvantages of

    (1.) The Monitorial system.
    (2.) The Simultaneous system.

7. Give notes of a lesson on

    (1.) Fractions, to a class beginning the subject.
    (2.) The Seasons, to an advanced class.

8. Describe the mode of proceeding at the Annual School Meeting.

9. State the changes effected by the new law in regard to

    (1.) Settlement of differences between Trustees and Teachers.
    (2.) Granting orders to teachers for school fund apportionment.
    (3.) Time of engaging teachers.

10. State the principal duties of Public School Teachers as laid down by law.

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No. 20.

CHEMISTRY AND CHEMICAL PHYSICS.

TIME—TWO HOURS AND A HALF.

1. Describe any instruments for detecting the presence of positive or negative electricity in a body.
2. What is an *electrophorus?* Describe its action.
3. What is meant by latent heat? Explain fully the statement that "the latent heat of steam is 536 thermal units."
4. Shew what is meant by *specific* and what by *atomic* heat. Explain the statement, "All metals possess the same atomic heat." The atomic heat of Silver Chloride is about 12·8 : find its specific heat.
5. What is ozone? Give its properties and modes of production.
6. Give the principal properties of H, and mention any of the modes of its preparation when K acts on water, state and fully explain the equation representing the chemical reaction.
7. Give the co-efficient of the expansion of gases. A volume of 800 cubic feet of gas at a temperature of 25° C. has its temperature increased to 45° C. Find the alteration in its volume.
8. Give the symbol and combining weight of Silicon. How does it occur in nature and how may it be obtained? Describe the only known oxide of Silicon.
9. Give the symbol of the principal oxdies of Nitrogen. 100 parts by weight of nitrogen pentoxide contain 25·93 parts of N. and 74·07 parts of O : shew how to find its formula.
10. Give the anatomy of the vocal organs.
11. Give the structure and functions of the different parts of the eye.

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No. 21.

NATURAL PHILOSOPHY.

TIME—THREE HOURS.

1. (*a*) Enunciate the principle of Virtual Velocities.

(*b*) Assuming the principle, deduce the relation that must subsist between the Power and the Weight in the inclined plane, in order that there may be equilibrium; pointing out *precisely* the quantities which represent the virtual velocities of the Power and Weight respectively; the Power being supposed to act parallel to the plane.

2. (*a*) In a straight lever, the lengths, CA, CB, measured to the left of the fulcrum C, are 6 and 10 feet respectively; and CD, CE, measured to the right, are 5 and 8 feet respectively. Mention any weights which, suspended from A, B, D, E, respectively, will keep the lever at rest.

(*b*) A balance has one of its arms 6 inches long and the other $6\frac{1}{2}$ inches. A package of tea is weighed out to a purchaser in the one scale against the weight of 2lbs. in the second scale; and another package is weighed out to him in the second scale against a weight of 2lbs. in the first scale. How much tea does he get altogether?

(*c*) A weight W is just sustained on an inclined plane by two forces, one of 9lbs., acting parallel to the base and towards the plane; the other of 21lbs., acting parallel to the plane, and in a upward direction. The base of the plane being 40 feet, and its perpendicular height 30 feet, what is W?

3. (*a*) Define *Specific gravity*. "A piece of marble (specific gravity 2.85) weighs 30lbs. in a liquid, and 35.9lbs. in the air; required the specific gravity of the liquid." (*Text book.*)

(*b*) A piece of wood, which weighs 70 oz. in the air, has attached to it a piece of copper which weighs 31.5 oz. in water. If the weight of the united mass in the water be 11.7 oz., find the specific gravity of the wood?

4. A cylindrical vessel, filled with water, rests on a horizontal table. Mention the different forces by which the mass of water is kept in equilibrium, pointing out those which mutually counterbalance one another.

5. (*a*) Describe the Syphon, and explain the principle of its action.

(*b*) Describe the Forcing Pump.

6. (*a*) When a body moves with a variable velocity, how is the velocity at any instant estimated? For instance, what is meant by saying that a body, falling to the earth under the force of gravity, has acquired, after 3 seconds from rest, a velocity of 96 feet per second?

(*b*) A body falling to the earth under the force of gravity has already been in motion for 3 seconds, and its distance from the earth is now 1152 feet. How long will it take to reach the earth?

* 7. A string passes over a fixed pully, and is stretched by weights A and B attached to its extremities, A being 5lbs., and B being 3lbs. The heavier weight A descends, raising the lighter B. What velocity does A acquire in a second, the pully being supposed to turn with perfect freedom?

* 8. A uniform glass tube, 4 inches in length, closed at the upper end, but open at the bottom, is immersed vertically in a vessel containing mercury, which is exposed to the pressure of the atmosphere, the depth to which it is sunk being such that the top of the tube is coincident with the surface of the mercury in the vessel. As much air is confined in the tube as would just fill the tube under the ordinary atmospheric pressure. If the height to which the atmospheric pressure would raise a column of mercury be assumed to be $28\frac{4}{9}$ inches, to what height does the mercury rise within the tube?

NOTE.—The per-centage of marks necessary, by the Regulations of the Council of Public Instruction, in order that a candidate may be ranked of a certain grade, will be taken on the value of the above paper, reduced by the omission of the marks allotted to the questions marked (*).

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No. 22.

BOOK-KEEPING.

TIME—ONE HOUR AND A HALF.

1. What is the object of book-keeping? State the books usually employed, and the use of each.

2. What is the distinction between real and fictitious accounts?

3. State fully how you balance the following accounts:—
    (*a*) Goods.
    (*b*) Profit and loss.
    (*c*) Balance.

4. What is meant by a trial balance?

5. Journalize the following transactions:—
    (*a*) Bought from McMaster & Co., 50 pieces cloth, containing 30 yards each, at $3½ per yard, paid cash $1000, and gave my note at 6 months for remainder.
    (*b*) Sold to John Smith, goods $300, received in cash $150, and his note at 3 months for the remainder.
    (*c*) Discounted the above note at 7 per cent.
    (*d*) Lost my pocket book containing $160.
    (*e*) The pocket book was found a few days after and returned, when I gave $10 to the finder.

6. Shew how to average an account. Bought goods from A. R. McMaster & Bro. as per invoice: April 4th, $600 on 4 months; May 15th, $980 on 6 months; June 12th, $1,020 on 4 months. Paid on account, May 20th, $750; June 5th, $720; July 10th, $300. When must I pay the balance?

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No. 23.

ENGLISH LITERATURE.

TIME—TWO HOURS.

1. Describe the ancient English Minstrel, and give the leading facts in the history of English Metrical Romance.

2. What is the distinctive feature of "Piers Plowman" as regards a substitute for rhyme? Give a specimen.

3. Write a brief biographical sketch of Sir Thomas More, and give an account of his "Utopia."

4. What was the first important work on Education in our literature.

5. "No English poem better illustrates the wonderful pliancy of the tongue we speak." To what poem does Collier here allude?

6. Point out the chief characteristics of the "Faerie Queen."

7. Write notes of criticism on "Pamela" and Sir Charles Grandison," and state the just estimate of Richardson's merits as a novelist.

8. Enumerate the principal forms and schools of poetry, and show what it is that lifts poetry above the level of mere verse.

9. Write notes on George Buchanan, Dryden, and Southey.

ENGLISH COMPOSITION.

Either of these subjects may be selected:—

1. The school is the world in miniature,—from the conduct of human life in the one we may derive principles and rules for the management of the other.

2. The employment of the mother tongue to a greater extent in our public schools as an instrument of mental culture.

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No. 24.

NATURAL HISTORY, BOTANY AND AGRICULTURAL CHEMISTRY.

TIME—TWO HOURS AND A HALF.

1. Mention any peculiarities in the eyes of insects. Describe the mouth of the beetle.
2. Give the leading characteristics of the Cephalopoda. Describe the shell of the Pearly Nautilus.
3. What are the cotyledons? Describe their functions, &c. State their value in systematic botany.
4. Describe the difference in structure and modes of growth of exogenous and endogenous stems.
5. Describe the circulation in plants. "In the act of making vegetable matter, plants purify the air for animals"—explain this fully.
6. What are Phænogamous plants? Define Raceme, Corymb, Head, Panicle, Ament.
7. Mention some of the principle elements of fertile soils, and some of those wanting in barren soils.
8. To what soils would you apply lime as a manure? State fully its beneficial effects.
9. A farm has been devoted to grazing purposes and after a length of time the cattle cease to thrive on it; what element has probably been extracted from the soil and how would you restore it?
10. What is meant by the rotation of crops, and on what principle is it based? Give a rotation of crops for a farm of 100 acres: (1) a light loamy soil, (2) a heavy clay soil.

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No. 25.

GEOGRAPHY.

TIME—ONE HOUR AND A HALF.

I. (1) Define the following: COLURES; DECLINATION; EQUINOCTIAL and SOLSTITIAL POINTS; PRECESSION of the EQUINOXES.

(2) Account for the Trade-winds.

(3) The longitude of Havana is 82° 23′ W.; that of Cape Town, 18° 28′ E.: When it is 2 P.M. at Cape Town, what o'clock is it at Havana?

II. (1) Distinguish between METAMORPHIC and IGNEOUS ROCKS, mentioning some of each class.

(2) To what periods of geological time does the formation of the Laurentian and Appalachian Mountains belong?

(3) Describe, by figure or otherwise, the strata on the Niagara River, at and immediately below the Falls.

III. (1) Enumerate the principal PLATEAUS or TABLE-LANDS of the Old and New World, with the elevation of each above the level of the sea.

(2) Show (by map or otherwise), from the intervening islands in each case, as well as from relative position, that Australia bears to Asia a relation remarkably similar to that which South America bears to North America.

IV. (1) Mention historical associations connected with the following places, giving dates where you can:—Corunna, Augsburg, Granada, Fontenoy, Thorn, Torbay, Shrewsbury, Meerut, Medina, Sinope, Chateauguay, Hartford.

(2) Derive the following:—Sebastopol, Labrador, Annapolis, Bonavista, Sarnia, Detroit, Antilles, Balize, Treves, Gloucester, Sierra Leone.

V. (1) Give some account of the Lake Superior section of Ontario, describing its boundaries, extent, and mineral resources.

(2) (*a*) Give the limits of the Province of Manitoba.

(*b*) Sketch, as precisely as you can (by map or otherwise), the route from Fort William to Fort Garry.

(*c*) By what rivers is Lake Winnipeg mainly supplied, and how does it discharge its waters?

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No. 26.

HISTORY.

TIME—TWO HOURS.

I. (1) (*a*) What was the immediate occasion of the Peloponnesian War?
(*b*) Recount the leading incidents of that war, giving dates.
(2) Enumerate the chief Grecian colonies, and compare the different systems of Greece and Rome in founding colonies.

II. (1) By whom and when was the first Agrarian Law proposed?
(2) Sketch as fully as you can the history and design of these laws, alluding specially to the Licinian Rogations, and the efforts made by the Gracchi, with their immediate effect and the final result.

III. (1) Give the date of de Montfort's celebrated parliament, and point out the special feature of that parliament which justifies us in regarding it as the foundation of the English House of Commons.
(2) (*a*) When do we find the Commons first resorting to the constitutional weapon of impeachment?
(*b*) On what great principle is the right of impeachment based?
(3) Give the date of the Act of Settlement; state its main object, and specify some of the constitutional safeguards it established.

IV. Give some account of the trial of Wilkes.

V. (1) What is meant by the "Pragmatic sanction?"
(2) What was the "Continental System" of Napoleon?
(3) Describe the anxious and embarrassing position in which Great Britain was placed after the defeat of Saratoga by European combinations against her.

VI. (1) "Thus, at a time when arbitrary rule was in the ascendant, was laid the foundation of some of the civil rights of the people of Lower Canada."—*Hodgins's History.* To what particular period during the French rule, and to what measures, is allusion here made?
(2) What changes were made by the *Constitutional* Act of 1791.
(3) What important change connected with the Constitution of the House of Assembly was made during Sir James Craig's short administration?

NOTE.—The percentage of marks necessary, by the regulations of the Council of Public Instruction, in order that a candidate may be ranked of a certain grade, will be taken on the whole value of the paper diminished by the number of marks allowed to uestions I., 2; II., (2); and III., 2.

PROVINCE OF ONTARIO.

EXAMINATION FOR FIRST CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS
PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE
COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 1st AUGUST, 1871.

No. 27.

ENGLISH GRAMMAR.

TIME—TWO HOURS.

1. Mention causes of diversity in Orthography, and state in what respects the English Alphabet is insufficient, redundant and inconsistent.

2. Define Middle Voice; Copulative and Disjunctive Coordination, and explain Dativus Ethicus; Adverbs of Deflection; Equivocal Reflective.

3. Give examples of the Indefinite Relative. To what restrictions is it subject?

4. To what Parts of Speech is the termination "ing" common? Show fully how they are to be distinguished.

5. (a.) Illustrate the primary and the secondary use of the Preposition.
   (b.) Draw up a Table exhibiting relations expressed by Prepositions.

6. Give Latham's opinion in regard to the question of concord when two or more pronouns of different persons, and of the singular number, follow each other disjunctively.

7. Parse the italicised words in the following sentences:—

   (a.) It is worth a *shilling*.
   (b.) Near *yonder* copse, where once the garden smiled.
   (c.) I know *what* book that is.
   (d.) *One* cannot be sure of that.
   (e.) Such a storm *as* now burst on them.

8. Correct or justify the following, giving in each case your reason:—

   (a.) "Of all who gave themselves up so recklessly to the enjoyment of the present, not one appeared to know that life was short till he was about to lose it."
   (b.) "The fire represented a symbol of the sun."—*Tytler.*
   (c.) "Wherever the giant came, all fell before him; but the dwarf had like to have been killed more than once."—*Goldsmith.*
   (d.) "Female blandishments never either absorbed his time or clouded his judgment."—*Alison.*
   (e.) "Nothing was wanting but vigor in following up the measure, adequate to the ability with which it had been conceived."—*Alison.*

9. Point out the difference between Barbarism and Solecism, and explain the figures Pleonasm, Metonymy Paragoge, and Synecdoche, giving examples, and indicating the class to which each belongs.

10. "In the spring a feeble crimson comes upon the robin's breast."
    "Oh ye woods, spread your branches apace!"
    "Far from its margin at times, and seeing the gleam of its water."
    Name the metre in each case, and mark the ictus of each foot.

11. Analyze the following, and give the derivation of the words which are numbered:—

> As yet this world was not, and Chaos[1] wild
> Reign'd where these heavens now roll, where
> Earth now rests
> Upon her centre poised; when on a day,
> (For time, though in eternity, applied
> To motion, measures all things durable
> By present, past and future) on such day
> As heaven's great year brings forth, the empyreal[2] host
> Of angels[3], by imperial[4] summons[5] called,
> Innumerable before the Almighty's throne
> Forthwith from all the ends of heaven, appear'd
> Under their hierarchs[6] in orders bright.
>
> —Milton.

PROVINCE OF ONTARIO.

EXAMINATION FOR FIRST CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION
AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF
THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 1st AUGUST, 1871.

No. 28.

ETYMOLOGY.

TIME—ONE HOUR.

N. B.—The per centage of marks necessary in order that a candidate may be ranked of a certain grade, will be taken n the value of the following paper, diminished by the number of marks assigned to questions 1, 2 and 3.

1. Latham speaks of ETYMOLOGY, "in the *wide* and in the *limited* sense of the word": Explain.

2. What argument does Max Muller regard as establishing conclusively, that "the English language is a branch of the great Teutonic stem of the Aryan family of speech?"

3. (*a*) Mention some of the Celtic elements of the English language.

   (*b*) Name the two branches of the Celtic stock of languages.

   (*c*) Which of these was most probably the language of Ancient Gaul? Confirm your answer by pointing out affinities.

4. What traces of Danish occupancy do we find in local names?

5. Which of the parts of speech are all of Saxon growth?

6. "Though all English comparatives, with two exceptions, end in *r*, no superlative ends in *rt*:" How has this happened?

7. (*a*) What proportion do words of Anglo-Saxon origin bear to those which come from a classical source?

   (*b*) Show that this proportion is not maintained in the language of ordinary intercourse.

8. Illustrate the influence of ONOMATOPŒIA in the formation of words.

9. Write brief etymological notes on the italicized words in the following:—

   (*a*) Wait *a while.*

   (*b*) Barbican it *hight.*—*Dryden.*

   (*c*) And leave their riches for *other.*—*Psalms.*

   (*d*) The womman schal haue an *hiling* on hir heed, also for aungels.—*Wiclifle's Translation of* 1 *Cor.* xi. 10

   (*e*) "If the salt have lost *his* savour, wherewith shall it be seasoned?"—*Luke* xiv., 35.

Department of Public Instruction.

PROVINCE OF ONTARIO.

EXTRACTS FROM THE OFFICIAL REGULATIONS.

8. *Time and place of each Examination.*—After 1871, the half-yearly examination of candidates for Second and Third Class Certificates shall be held in each County Town at 9 a.m., on the second day of January (or on the third day, should the second fall on Sunday), and on the third Tuesday in July in each year. and shall continue for not more than six hours each for five days. It shall be held in such building as may be appointed by the Inspector, who shall give at least three weeks' public notice thereof, in such manner as he shall deem expedient. The examination of candidates for first-class certificates shall be held at the same place, on the Tuesday next after the close of the other examination; but all candidates for first-class certificates, who do not already possess second class Provincial certificates, shall be required to previously pass the examination for such second class certificate.

9. *Proceedings at each Examination.*—The Inspector shall preside at the opening of the examination; and, at 9 o'clock on the morning of the first day, in the presence of such of his colleagues as may be there, and of the candidates, he shall break the seal of the package of examination papers received for that examination, from the Education Department. He shall also break open the seal of each additional packet of examination papers as required, in the presence of a co-examiner and of the candidates. He shall further see that at least one examiner is present during the whole time of the examination, in each room occupied by the candidates. He shall, if desirable, appoint one or more of his co-examiners (1) to preside at the examination in any of the subjects named in the programme: (2) to read and report upon the answers as they are received.

DAYS AND HOURS OF EXAMINATION FOR SECOND AND THIRD CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, COMMENCING 25th JULY, 1871.

TIME OF EXAMINATION.	SUBJECT.
TUESDAY, 25th JULY.	
From 9 a.m to 12 noon	Arithmetic and Mensuration.
" 2 p.m. to 3.30	Book-Keeping (not required for Third Class).
" 3.45 p.m. to 5.15	Etymology.
WEDNESDAY, 26th JULY.	
From 9 a.m. to 12 noon	History
" 1.30 p.m. to 2	Reading (Third Class).
" 2.05 p.m. to 5 05	Geography.
THURSDAY, 27th JULY.	
From 9 a.m to 11.30	Grammar.
" 1 p.m. to 3.30	Education and School Law.
" 3.35 p.m. to 6.05	Special (Optional) paper, on Natural History, Botany, and Agricultural Chemistry.
FRIDAY, 28th JULY.	
From 9 a.m. to 11.30	Algebra (not required for Third Class).
" 11.40 a.m. to ~~11.20 p.m.~~ 12:40	Reading (Second and Third Class).
" 2 p.m. to 5	Natural Philosophy (not required for Third Class.)
SATURDAY, 29th JULY.	
From 9 a.m. to 11.30	Chemistry, Botany and Physiology (not required for Third Class).
" 11.45 a.m. to 12.15	Reading (Second Class).
" 2 p.m. to 4.30	Euclid (not required for Third Class).

EXAMINATION FOR FIRST-CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, COMMENCING 1st AUGUST, 1871.

TIME OF EXAMINATION.	SUBJECT.
TUESDAY, 1st AUGUST.	
From 9 a.m. to 12 noon	Arithmetic and Mensuration.
" 2 p.m. to 5	Euclid.
WEDNESDAY, 2nd AUGUST.	
From 9 a.m. to 12 noon	Algebra.
" 2 p.m. to 5	Education and School Law.
THURSDAY, 3rd AUGUST.	
From 9 a.m. to 11.30.	Chemistry and Chemical Physics.
" 2 p.m. to 5.	Natural Philosophy.
FRIDAY, 4th AUGUST.	
From 9 a.m. to 10.30	Book-Keeping.
" 10.40 a.m. to 12.40 p.m.	English Literature.
" 2 p.m. to 4.30	Natural History, Botany, and Agricultural Chemistry.
SATURDAY, 5th AUGUST.	
From 9 a.m to 10.30	Geography.
" 10.40 a.m. to 12.40 p.m.	History.
" 2 p.m. to 4.	Grammar.
" 4.10 p.m. to 5.10	Etymology.

PROVINCE OF ONTARIO.

EXAMINATIONS FOR ~~FIRST AND~~ SECOND PROVINCIAL, AND THIRD CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

REFERENCES AND ANSWERS FOR HISTORY PAPERS FOR SECOND AND THIRD CLASS.

TEXT-BOOKS, "Collier's Outlines of General History," and "Hodgins's History of Canada."

I. (1) p. 12. (2) p. 23. (3) Asia Minor, Greece, and Rome, *certainly*; and *probably* Spain, Gaul, and even Britain. St. Paul suffered martyrdom at Rome, A.D., 66, in the reign of the Emperor Nero.

II. (1) p. 29. (2) p. 31.

III. (1) p. 38. (2) p. 42.

IV. (1) p. 74. (2) p. 163. (3) p. 165.

V. p. 184.

VI. p. 173.

VII. (1) p. 279. (2) p. 282.

VIII. (1) p. 117. (2) p. 151.

IX. (1) p. 24 (Hodgins). (2) p. ~~11~~ 30 (Hodgins).

X. (1) p. 252 (Collier). (2) p. 261 (Collier). (3) p. 283.

XI. (1) p. 94 (Hodgins). (2) p. 194 (Hodgins).

ANSWERS TO QUESTIONS IN ALGEBRA—SECOND CLASS PAPER.

1. $-a$.

2. See Text Book, Exercise 20, Problem 8.

3. See Text Book, Article 63, Example 2.

4. (*a*) See Text Book, Article 92. The rule does *not* hold for more than two expressions.
   (*b*) See Text Book, Exercise 23, Problem 9.

5. See Text Book, Article 74.

6. (*a*) $\frac{27}{38}$.
   (*b*) $\frac{1}{5}$ and $\frac{1}{6}$.
   (*c*) See Text Book, Exercise 34, Problem 13.

7. 78.

8. 6 and 8.

9. The examiners will judge of the proof offered.

10. See Text Book, article 149.

PROVINCE OF ONTARIO.

EXAMINATIONS FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION
AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF
THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

ANSWERS FROM LATHAM TO CERTAIN QUESTIONS IN GRAMMAR AND ETYMOLOGY.

One of the questions in GRAMMAR (14) and two in ETYMOLOGY (12 and 13) have been founded on Latham's Hand Book. As it may not be possible, in every instance, to obtain that book, the answers to these questions are subjoined :

Grammar, (14).—" A little consideration will show that this rule is absolute. For a man *to be doing* one action (in present time) in order that some other action may *follow* it (in past time) is to reverse the order of cause and effect. To do something in A. D. 1851, that something may result from it in 1850, is a contradiction and so is it to say, '*I* do *this* that *I* might *gain by it.*

" The reasons against the converse construction are nearly, if not equally, cogent. To have done anything at any *previous* time in order that a *present* effect may follow it, is, *ipso facto*, to convert a past act into a present one, or to speak in the language of the grammarian, to convert an aorist into a perfect."

Etymology, (12). –The introduction of words with the retention, to a certain extent, of their original inflexion. The phenomenon of imperfect incorporation is reducible to the following rules :—

1. That it has a direct ratio to the date of the introduction, *i. e.*, the more recent the word the more likely it is to retain its original inflexion.

2. Inflexion, in some instances, has a relation to meaning,—thus genius, genii (*spirits*), geniuses (*men of genius.*)

3. It occurs with substantives only, and that only in the expression of number. Thus *axis* and *genius* are Latin, but the possessive is English. So comparison of adjectives like *circular*, and tenses, &c., for verbs like *perambulate*.

(13). Hybridism (from *hybrida*, a mongrel,) is the formation of words in the composition of which linguistic harmony has been disregarded—*e.g.*, *witticism* is hybrid, being composed of Saxon root and Greek termination.

The *icle* in *icicle* is apparently the same as the *icle* in *radicle*, now as *ice* is Gothic, and *icle* classical, hybridism is simulated. *Icicle*, however, is not a derivative, but a compound ; its parts being *is* and *gicel*, both Anglo-Saxon words.

READING AND DICTATION

As an exercise in READING, there may be used for all the Candidates the following selections from the Fifth Book :—

Prose.—Death of George the Third, (latter part) page 278.
Poetry.—Hymn before sunrise in the vale of Chamouni, from "And you, Ye five wild torrents fiercely clad !" to the end. Page 329.

For DICTATION, the following may be taken : Fifth Book, page 314, from " In his hour of presumption and ignorance," to end of selection.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 25th JULY, 1871.

NATURAL PHILOSOPHY.

ANSWERS TO QUESTIONS.

1. 4.

The pressure on the fulcrum is 6 lbs.

2. The Examiners must judge of the deduction.

3. Centre of gravity is at B.

4. (*a*) 26.

(*b*) 27.

5. 60 feet of height for 100 feet of length.

6. See text-book, page 45.

7. See text-book, page 80.

8. (*a*) A force which produces the same increase of velocity in each new unit of time. The formula, $g = 32$, means that the force of gravity increases the velocity of a falling body by 32 feet per second in each second during which the body continues to fall.

(*b*) Velocity after 6 seconds is 192 feet per second.

Space described in the 7th second, 208 feet.

(*c*) 400 feet.

9. (*a*) See text-book, page 100.

(*b*) See text-book, page 101.

(*c*) See text-book, page 104.

(*d*) 432 lbs., atmospheric pressure being taken at 15 lbs. on the square inch.

10. (*a*) Weight of beam, acting vertically downwards at its middle point ; the pressure exerted by the man acting as described in the question ; the reaction of the ground against the end of the beam which rests on the ground, acting vertically upwards ; and friction, acting horizontally.

(*b*) 50 lbs.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES.—JULY, 1871.

Values assigned by the Central Committee of Examiners.

See General Regulations respecting the Examination of Candidates for Certificates, Nos. 7 and 8.

NATURAL PHILOSOPHY	Questions	1	2	3	4 (*a*)	(*b*)	5	6	7	8 (*a*)	(*b*)	(*c*)	9 (*a*)	(*b*)	(*c*)	(*d*)	10 (*a*)	(*b*)
	Number of Marks for Correct Answer.	5	8	10	8	8	7	8	8	8	6+6	10	4	8	8	12	8	10

EUCLID	Questions	1	2	3	4	5	6	7	8	9
	Number of Marks for Correct Answer.	10	10	10	10	10	12½	12½	12½	12½

ALGEBRA.........	Questions	1	2	3	4 (*a*)	(*b*)	5	6 (*a*)	(*b*)	(*c*)	7	8	9	10
	Number of Marks for Correct Answer.	6	6	10	10	10	8	8	10	10	10	12	10	12

	Questions	I. (1) (2)	II. (1) (2)	III. (1) (2)	IV. (1) (2)	V. (1) (2) (3)	VI. (1) (2)	VII. (1) (2)	VIII. (1) (2)	IX.	X. (1) (2)	XI.	XII.
ARITHMETIC ..	Number of Marks for Correct Answer.	4 7	3 6	4 6	5 5	4 4 2	4 6	4 7	3 7	12	4 6	10	12
CHEMISTRY, BOTANY, & PHYSIOLOGY	Number of Marks for Correct Answer.	(1) 3 (2) 5	10	8	(1) 3 (2) 5	(1) 4 (2) 4	(1) 5 (2) 5	(1) 4 (2) 4 (3) 3	10	10	10	(1) 5 (2) 4	10
BOOK-KEEPING	Number of Marks for Correct Answer.	5	9	10	5 5	12							
PAPER FOR SPECIAL CERTIFICATES IN AGRICULTURE, &c.	Number of Marks for Correct Answer.	(1) 4 (2) 4	(1) 4 (2) 6	(1) 3 (2) 3 (3) 4	(1) 4 (2) 4	(1) 4 (2) 4	9	(1) 4 (2) 4	8	7	(1) 4 (2) 5	(1) 5 (2) 5	9
EDUCATION	Number of Marks for Correct Answer.	10	(1) 5 (2) 5	6	8	10	(1) 5 (2) 5	(1) 5 (2) 5 (3) 5	(1) 5 (2) 5				

NOTE.—For the Third Class Papers in *Arithmetic* and *Education*, the value of Each Question is fixed at 10 Marks.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS CERTIFICATES.—JULY, 1871.

Values assigned by the Central Committee of Examiners.

HISTORY	Questions	I. 1	2	3 (*a*)	(*b*)	II. 1 (*a*)	(*b*)	(*c*)	2 (*a*)	(*b*)	III. 1	2 (*a*)	(*b*)	IV. 1 (*a*)	(*b*)	2	3	V.
	Number of Marks for Correct Answer.	4	4	3	1	3	3	6	3	3	6	4	4	3	3	4	4	4
	Questions	VI. (*a*)	(*b*)	VII. 1	2 (*a*)	(*b*)	VIII. 1	2 (*a*)	(*b*)	IX. 1	2	X. 1	2 (*a*)	(*b*)	(*c*)	3	XI. 1	2
	Number of Marks for Correct Answer.	3	7	7	3	3	6	4	4	7	4	5	3	3	3	4	7	12

GEOGRAPHY	Questions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Number of Marks for Correct Answer.	16	6	6	10	6	10	16	10	5	4	6	15	6	6	6	10

ENGLISH GRAMMAR	Questions	1	2 (*a*)	(*b*)	3	4	5	6	7	8	9	10 (*a*)	(*b*)	11	12 (1)	(2)	(3)	13	14	15	16	17 (*a*)	(*b*)	(*c*)	(*d*)
	Number of Marks for Correct Answer.	12	3	3	6	3	5	3	3	6	8	3	3	8	3	3	10	8	10	6	10	10	3	3	2

ETYMOLOGY ...	Questions	1	2	3	4	5	6	7	8	9	10	11	12	13
	Number of Marks for Correct Answer.	3	5	7	6	6	4	5	8	7	10	12	15	10

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 1.

NATURAL PHILOSOPHY.

TIME—TWO HOURS.

1. Describe the Wheel and Axle, stating the relation between the Power and Weight, necessary in order to equilibrium.

2. Describe the Screw, stating the relation between the Power and Weight, necessary in order to equilibrium.

3. Show that the principle of Virtual Velocities holds in the Screw.

4. A body, situated at A, one of the angular points of the square A B C D, whose diagonal is A C, is acted on by three forces, represented in magnitude and direction by the lines A B, A C, AD, respectively. Draw a line representing, in magnitude and direction, a fourth force, which, in connection with the three above mentioned, would keep the body at rest.

5. A uniform straight lever A B C, whose fulcrum is B; weighs 10 lbs. The arm A B is 12 feet; the arm B C, 8 feet. Weights of 8 and 12 lbs. are suspended from A and C respectively. Find the additional weight which must be suspended from C, in order to keep the lever at rest; the weight of the lever being taken into account.

6. What relation subsists between the density of a gas, and its elasticity? By whom was the law, that expresses the relation, discovered.

7. Describe any experiment by which the law, referred to in the previous question, is established.

8. Into a closed cubical vessel, whose capacity is 8 cubic feet, as much air is condensed as, under the ordinary atmospheric pressure, would fill a cylinder whose height is $\frac{8}{3\cdot1416}$ feet, and the radius of its base 2 feet. Find the whole pressure of the inclosed air on the interior of the cubical vessel.

9. Describe the Common Pump, explaining the principle of its action. What limit is there to the distance between the surface of the water in the well, and the lowest point in the range of the piston?

10. A sphere, whose radius is two feet, is sunk in water to such a depth that its centre is ten feet below the surface. Find the pressure of the water on the surface of the sphere: the weight of a cubic foot of water being assumed to be 1000 oz.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 2.

BOOK-KEEPING.

TIME—ONE HOUR AND A-HALF.

1. Describe the two kinds of book-keeping. How would you ascertain the position of your business in book-keeping by single entry?

2. Describe the Day-book, Invoice-book, Ledger and Bill-book. Exhibit a specimen of the last.

3. You commence business with a capital of $12,000, viz., $6,000 cash, $3,000 borrowed from A. B. for three years at 6 %, and a note which you hold against C. D., payable in 6 months, what entries will you make?

4. Describe the Journal, and give the rules for Journalizing.

5. Enter in your Journal the following transactions:—
    (1.) Consigned goods to A. B. $3,000, receiving on a/c. $1,200.
    (2.) Received from C. D. his note at three months in settlement of his a/c.
    (3.) Bought goods from E. F. $2,000, giving cheque on Bank of Toronto $1,600, and your note at three months for the balance.
    (4.) Sold goods to G. H. $2,500, receiving cash $1,500, and his note at 6 months for balance.

6. You agree to transfer John Brown's a/c. to James Smith on the authority of an order from the latter in favour of the former. Exhibit the entry you would make.

7. Show what entries you would make in the following cases:—
    (1.) You have charged A. B. 200 lbs. flour at $6 25, whereas the sale was made at $5 90.
    (2.) You wish to charge C. D. with 6 months interest on his note of $675 50 at 8 %.

8. Sold goods on three months' time to A. B. as follows:—

May 10th	$500
May 21st	400
June 10th	300
June 30th	800

Find the average time when the whole should be paid.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND PROVINCIAL AND THIRD CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 3.

ETYMOLOGY AND SPELLING.

TIME—ONE HOUR AND A QUARTER.

1. What changes, for the sake of euphony, do the following prefixes undergo,—"ad," "con," "sub," "syn?"
2. Correct, where necessary, the spelling of the following:—Buoyancy; idiosyncrasy; liquify; sycamore; suppœna; hyssup; reminiscence; physionomy; maneuvre; cameleopard.
3. Mention prefixes, each in combination with some word, which denote rest and motion *forward* and *backward* in place and time.
4. Give words in which the following affixes appear, and state the force of each affix:—"ard," "eer," "ory," "dom," "sy," "ment."

ADDITIONAL FOR SECOND CLASS CANDIDATES:—

5. Give words—two in each case—derived from these Greek roots:—Ago, biblos, martur, deka, scopeo, tupos.
6. Trace the following to Latin roots:—Egregious, lateral, illusion, annex, complex, pulverize, quotient, satisfy, scripture, extortion, adult, monument.
7. Derive the following:—Foliage, atone, demagogue, lieutenant, remnant, jelly, closet.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 4.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

[*3rd Class may omit Questions under* 9, 10 *and* 11.]

1. Give a brief account of the Medes and Persians before their union under Cyrus the Elder.

2. How far did Alexander the Great advance into Northern India. Recount briefly succeeding events to the close of his life.

3. Give some account of the Conspiracy of Catiline.

4. What was the Holy League? Mention any remarkable incidents in the war that followed the formation of the League.

5. Date of Napoleon's escape from Elba? Describe briefly the leading events between that date and his imprisonment in St. Helena.

6. *(a)* Give a short account of the Norman Conquest of England.
   (b) Enumerate the Kings of the direct Plantagenet line, and mention the principal events that occurred whilst they occupied the throne.
   (c) How was Mary Queen of Scots connected with the House of Tudor?
   (d) When did the Indian Mutiny break out? Give a brief account of it.

7. *(a)* Give an account of the early settlement of Pennsylvania.
   (b) State fully the circumstances which led to the War of 1812.

8. *(a)* Describe Cartier's visit to Hochelaga.
   (b) (1.) In what form was the feudal system introduced by the French into Canada? (2.) How was it subsequently modified?

9. *(a)* State what was done during the Tudor period to promote learning and education.
   (b) When, and for what purpose, was the Court of Star Chamber instituted? Exhibit its unconstitutional character.

10. State the circumstances under which Denmark lost the Duchies of Schleswig and Holstein.

11. When did the Act of Union of the Two Canadas take effect? Mention its peculiar features.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL, AND THIRD CLASS COUNTY CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 5.

READING AND DICTATION.

As an exercise in Reading, the following selections from the Fifth Book may be used for all the Candidates ;

Prose.—Death of Nelson, page 259. "The Death of Nelson was felt, &c."

Poetry.—Part of Anthony's Speech in Julius Cæsar ; "If you have tears," &c., page 479.

For Dictation, the following may be taken : Fifth Book, page 313 ; from "*In the study,*" *&c.*, down to "*time and space.*"

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No. 6.

EDUCATION.

TIME—ONE HOUR AND A HALF.

1. What points should be considered in selecting a school site?

2. Discuss the importance of well arranged school grounds.

3. Give, with description, the ground plan of a rural school-house, suitable for the accommodation of 60 pupils.

4. How would you teach Arithmetic to a class of beginners, and reading to an advanced class?

5. What do you consider to be the characteristics of a good "style of questioning"? Show the importance of insisting on a correct "style" of answering.

6. Define *punishment.* Mention any modes of punishment that you think admissible, and state rules to be observed in its infliction.

7. You are appointed, with three assistants, to a school of 200 pupils. Describe your method of organizing.

8. Show how you would convey clear notions of the following facts:
    (1.) That in every case the multiplier must be an abstract number.
    (2.) That both terms of a fraction may be multiplied by the same number without changing its value.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 7.

SCHOOL LAW OF ONTARIO.

TIME—ONE HOUR AND A-HALF.

[NOTE.—*Minimum qualifications for Second Class Certificates.*—"Candidates are required to have a knowledge of the School Law, and official regulations relating to Trustees and Teachers."

I. State briefly what are the provisions of the law respecting Trustees in regard to :—
  (1.) Their (*a*) qualifications, (*b*) acceptance of and (*c*) continuance in office.
  (2.) Vacation of office—distinguishing between (*d*) resignation, (*e*) absence, (*f*) removal, (*g*) non-residence.
  (3. What are declared to be incompatible with the office and obligations of Trustees.
  (4.) Erection of a school-house, its cost, size, &c.
  (5.) The "outgoing Trustee."

II. What obligations are imposed by the School Act upon Trustees in regard to :—
  (6.) Employing Masters and Teachers?
  (7.) Keeping their school open?
  (8.) Exacting security from their collector and secretary-treasurer?
  (9.) Establishing a school library?
  (10.) Providing school accommodation for all resident children?

III. Explain the provisions of the Consolidated School Act in regard to :—
  (11.) How and what the Master of a school shall teach.
  (12.) Who shall hold examinations of the school, and how often.

PROVINCE OF ONTARIO.

EXAMINATION FOR THIRD CLASS COUNTY CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

No. 8.

EDUCATION AND SCHOOL LAW.

TIME—TWO AND A HALF HOURS.

What is education? Shew clearly the distinction between education and instruction.

What is meant by School discipline? How is it to be attained in a School?

You are appointed to a School in which the classification and the discipline have been very imperfect; describe as fully as you can, your first proceedings on entering upon your new duties.

Discuss the importance of mechanical drill in maintaining good order in a School.

Distinguish Intellectual and Mechanical teaching. Illustrate these two modes as applied in teaching Arithmetic.

Give notes of an introductory lesson in :—

1. Grammatical analysis.
2. Mathematical Geography.
3. Simple Proportion.

State the duties of Teachers, as to :—

1. Teaching and Discipline.
2. Course of Study and Text-books prescribed.
3. School records and examinations.

What are the regulations of the Council of Public Instruction regarding the powers and duties of Masters as to :

1. Suspension and expulsion of pupils.
2. School premises, etc.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 9.

GEOGRAPHY.

TIME—TWO HOURS.

I.—1. Name the three branches of Geography, and state the province of each.
2. Define EQUATOR, ECLIPTIC, LATITUDE, LONGITUDE, ISTHMUS, PENINSULA, ARCHIPELAGO.

II.—1. Name the five great mountain-chains of Europe, stating the position of each.
2. Give the boundaries of Europe and its political divisions, with their capitals.
3. (*a*) Into how many counties has England been divided?—classify them. (*b*) Name the large manufacturing towns with their manufactures.

III.—1. Into what bodies of water do the following rivers discharge themselves:—Mississippi, Rhone, Loire, Mersey, Don, Indus, Ganges?
2. State accurately the position of the following:—Liverpool, St. of Bonifacio, Staffa, Hebrides, Belfast, Pentland Firth, Candia, Balearic Isles, Lyons, Copenhagen.
3. What State N. of Tennessee? What State E. of Alabama? What countries bound France on the East? On what river is Lisbon?

IV.—1. Give the boundaries of the Province of Quebec.
2. Name the Provinces which form the Dominion of Canada, and describe briefly its form of Government.

ADDITIONAL FOR SECOND CLASS.

V. Give proofs of the earth's sphericity.

VI. What portions of Africa lie along the Mediterranean Sea? What country between Egypt and Abyssinia? What country S. of Affghanistan? What country W. of Anam? What Gulf between Anam and China Proper?

VII. State the position of the following in the Dominion of Canada:—St. Hyacinthe, Shediac, Lake Metapediac, Pembroke, Gaspé, Orillia, Truro, Charlottetown, St. of Belle Isle.

VIII. Draw a map of the Baltic Sea and coast of adjacent countries, marking towns and rivers as far as time may allow.

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COMMENCING 18th DECEMBER, 1871.

No. 10.

CHEMISTRY.

TIME.—TWO HOURS.

1. What is the characteristic of a chemical element? Illustrate by examples the difference between a mixture of two bodies and their chemical combination.

2. State and illustrate the laws of chemical combination.

3. State the composition of water, and give the principal properties of the elements which compose it.

4. What is carbon? In what form does it occur? What are its principal properties and uses?

5. State fully the properties of Carbonic Acid.

6. What are the principal compounds of Sulphur and Oxygen? State their properties and uses.

7. State generally the composition of the following substances:—Common Salt, Muriatic Acid, Glauber Salts, Hard Soap, Soft Soap, Gunpowder, Saltpetre, Epsom Salts.

8. Give an account of the most important compounds of iron. Describe how iron is obtained from its ores.

9. What are the principal ores of copper? Which is the most important?

10. In what form does *lead* occur in nature? Name its principal ores and alloys.

PROVINCE OF ONTARIO

EXAMINATION FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 11.

ALGEBRA.

TIME—ONE HOUR AND A HALF.

1. Find the continued product of the expressions, $a - x$, $x + a$, $a^2 + x^2$, $a^4 + x^4$, $a^8 + x^8$, $a^{16} + x^{16}$, $a^{32} + x^{32}$.

2. Divide by Horner's synthetic method, $x^4 + 4x + 3$ by $x^2 + 2x + 1$.

3. Add together the fractions, $\frac{4(1 - 5x)}{4x^2 - 1}$ and $\frac{7}{2x - 1}$, and subtract $\frac{3}{1 + 2x}$ from their sum.

4. Solve the equation $\frac{1}{x} - \frac{3}{4x} - \frac{1}{7} = 0$.

5. Solve the equation, $x^2 - \frac{2(1 - x)(3 + x)}{5} - \frac{3 - 7(2 - 7x)(4 + x)}{35} = 0$.

6. Solve the simultaneous equations, $-2 + \frac{7}{x} + \frac{5}{y} = 0$, and $\frac{161}{x} - \frac{116}{y} + \frac{1}{5} = 0$.

7. A horse keeper not having room in his stables for 8 of his horses, built so as to increase his accommodation by one half, and now has rooom for 8 more than his whole number. How many horses had he?

8. Two men, A and B, are walking in the same direction; B being 300 of A's steps in advance of A. For every three steps that A takes, B takes four; but two of A's steps are as long as three of B's. How many steps must A take before overtaking B?

9. Prove that if a quantity measure the sum or difference of two other quantities, it will also measure the sum or difference of any multiples of these two quantities.

10. Prove that when n is an odd number, $x^n - a^n$ is not divisible (without remainder) by $x + a$.

PROVINCE OF ONTARIO

EXAMINATION FOR SECOND CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 12.

BOTANY AND PHYSIOLOGY.

TIME—TWO HOURS.

1. What are the principal parts of a plant? Describe fully the functions of each part.
2. How are plants classified as to their character and duration of their growth? Give examples of each class.
3. Describe leaves, and state fully their functions. Shew their necessity to plants, and the consequences of their destruction.
4. Name the different parts of the flower. Describe the stamens and pistils, and give the terms applied to their parts.
5. What is the fruit? What is a *simple* fruit?
6. What precautions are necessary in transplanting?
7. Describe the organs of respiration and digestion.
8. Give the structure and function of the vocal organs.
9. What are the usual defects of vision, and how may they be remedied?
10. Name and briefly describe the organs of the nervous system.
11. On what does the amount of heat generated in the human system depend? By what element of the food is it influenced?
12. Name the bones of the upper extremities. Describe the scapula, clavicle, and fore-arm.

PROVINCE OF ONTARIO.

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COMMENCING 18th DECEMBER, 1871.

No. 13.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. Prove the rules for converting pure recurring Decimals and mixed do. into Vulgar Fractions.

2. Simplify. $\left\{ \frac{2\frac{1}{3}}{16} + \frac{3\frac{1}{3}}{12} \text{ of } 3\frac{1}{4} - \left(\frac{7}{16} \text{ of } 1\frac{16}{21} - \frac{1}{6}\right) \div \left(\frac{1\frac{1}{4}}{14} - \frac{3}{7} \text{ of } \frac{1}{8}\right)\right.$.

3. A dealer received an invoice of glassware, 15% of which was broken; at what % above cost must the remainder be sold to clear 20% on the Invoice?

4. Give the Rule for Equation of Payments; what is assumed in this Rule? A person owed $3,000, payable in 10 months; he paid $300 in 4 months, and $1,000 at the end of 9 months; when was the balance due?

5. A. and B. agree to do a certain piece of work for $25; A. could do it in 8 days, and B. in 10; but C. joining them, the work is done in 3 days: how should the money be divided?

6. State the difference between "True" and "Bank" discount. I owe a man $575, and give him a Note at 60-days: what must be the face of the note to pay him the exact debt, when discounted at (Bank discount) 1½% a month?

7. A drover bought oxen at $40, cows at $30, and sheep at $10 a head; there were 2½ times as many cows as oxen, and 5 times as many sheep as cows, and the whole cost was $1,440; how many of each kind did he buy?

8. Find the cost of painting a room 20 ft. 3 in. by 18 ft. 6 in., and 10 feet high, having two windows, each 7 ft. by 4 ft., at the rate of 50 cents a square yard.

9. An importer pays for freight and duty 10% on cost price, and sells to the retailer at a profit of 20%; the retailer sells to the consumer at a profit of 25%; find the amount paid by the consumer for goods which cost the importer $8,250?

10. The boundary lines of a field are the following: the first runs north 36 rods; the second, north-east 60 rods, the third, south 72 rods; and the fourth, west to the place of beginning, 48 rods: required the number of acres in the field.

11. The sides of a rectangle containing 34,992 square feet, are as 4 to 3: find them.

12. There is a circular fish pond of 90 feet radius, surrounded by a walk 25 feet in breadth: find the area of the walk.

N. B.—Full work required; the mere answer to a question will count nothing.

PROVINCE OF ONTARIO.

EXAMINATION FOR THIRD CLASS COUNTY CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

No. 14.

ARITHMETIC.

TIME—THREE HOURS.

1. (1.) Divide £4,762 15*s.* $9\frac{3}{4}$*d.* by 300.

   (2.) My house and lot cost £661 15*s.* 9*d.*; the house cost $15\frac{1}{2}$ times as much as the lot; find the cost of the house.

2. Shew clearly that both terms of a fraction can be multiplied by the same number, without changing the value of the fraction.

3. Simplify. $\left\{ \left(1\frac{3}{8} + \frac{5}{4} \text{ of } \frac{21}{11\frac{2}{5}} - \frac{\frac{5}{6}}{2\frac{1}{2}}\right) \div 2\frac{77}{114}. \right.$

4. A sum of money was divided among A., B., and C.; A. received $\cdot 9\dot{3}\dot{9}$ of $\frac{15}{31}$ of it; B., $\frac{3}{11}$ of it, and C., \$3,015.30; find the amount divided.

5. A trench 80 yards long, 10 feet deep and 9 feet wide, was completed by 20 men in $12\frac{1}{2}$ days, of ten hours each; and a trench 76 yards long, and twelve feet deep was completed by thirty men in $7\frac{1}{2}$ days, of $9\frac{1}{2}$ hours each; how wide was the latter trench?

6. The cost of carpeting a room $10\frac{1}{2}$ yards long, with carpet 27 inches wide, and costing \$1.35 a yard, was \$93.15: find the width of the room.

7. A grocer mixes 60 lbs. of tea at 65 cents a lb., with 80 lbs. at 60 cents a lb.; at what rate per lb. must he sell the mixture to gain 30%?

8. A person loaned \$480 for two months and 13 days at 9%: what interest did he receive?

9. I send \$5,250 to a commission merchant in Montreal, who charges 5% for investing, with instructions to purchase certain goods, deducting his commission from the amount of money sent him; find his commission.

10. A coal-dealer bought 784,000 lbs. of coal, at \$4.50 a ton (2240 lbs.), and sold 524,500 lbs. of it at the rate of \$5.50 per short ton (2,000 lbs.), and the balance at \$4·20 per short ton: find his whole gain.

N. B.—Full work required; the mere answer will count nothing.

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COMMENCING 18th DECEMBER, 1871.

No. 15.

ENGLISH GRAMMAR.

TIME—TWO AND A HALF HOURS.

[*2nd Class will omit* 4, 5 *and* 10.]

1. Define Abstract Noun, Relative Pronoun, Verb Transitive and Intransitive, Adverb, Preposition.

2. Which of the Parts of Speech are inflected?

3. Quote any two of the special rules for the formation of the plural of nouns, and write the plurals of the following:—Wharf, folio, echo, chimney, spoonful, Mussulman, cherub, memorandum, miasma, alumnus, aide-de-camp.

4. Give any six examples of irregular comparison of adjectives, and state the classes of adjectives which do not admit of comparison.

5. Give a list of the auxiliary verbs.

6. How many tenses are there in the potential mood? Give the signs of each.

7. Give the principal parts of the following verbs:—set, flee, seethe, cleave (to split), bear (to bring forth), shear.

8. Quote the rules of syntax which the following sentences are severally intended to exemplify:—
   (*a*) The king appointed him *commander-in-chief*.
   (*b*) Neither joy nor sorrow *moves* his heart.
   (*c*) The wall is six *feet* high.

9. Parse the following sentence, and change its form, so that it shall contain a nominative absolute:—
   "When fresh troops had arrived, the battle was resumed."

10. Analyze the following:—
    "How many verses were woven in the fragrant meadows, or by the chime of the silver stream, we do not know; but the odours and the colours of sweet rural life breathe and brighten in every line."

Additional for Second Class.

11. State the various uses of the pronoun "it."

12. Examine the correctness of the following, giving in each case your reason for retaining or altering the construction:—

    I cannot say that I admire this construction, though it be much used.—*Priestley's Grammar.*
    Let no one touch it but they who are clean.—*Sale's Koran.*
    What I have said of the Bible's not being designed to give such full instruction, &c.—*Whately.*
    Shakspeare is more faithful to the true language of nature than any writer.—*Blair.*

13. Analyze the following:—

> "They sat them down to weep; nor only tears
> Rain'd at their eyes, but high winds worse within
> Began to rise; high passions, anger, hate,
> Mistrust, suspicion, discord; and shook sore
> Their inward state of mind, calm region once
> And full of peace, now lost and turbulent."—Milton—*Paradise Lost,* ix. 1121.

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COMMENCING 18th DECEMBER, 1871.

No. 16.

EUCLID.

TIME.—TWO HOURS AND A HALF.

I. If two triangles have two sides of the one equal to two sides of the other, each to each, and have likewise their bases equal, the angle which is contained by the two sides of the one shall be equal to the angle contained by the two sides, equal to them, of the other.

II. Triangles upon the same base, and between the same parallels, are equal to one another.

III. If the square described upon one of the sides of a triangle be equal to the squares described upon the other two sides of it, the angle contained by these two sides is a right angle.

IV. If a straight line be divided into two equal, and also into two unequal, parts, the squares on the two unequal parts are together double of the square on half the line, and of the square on the line between the points of section.

V. If a straight line be divided into any two parts, the rectangles contained by the whole and each of the parts are together equal to the square on the whole line.

VI. Bisect a parallelogram by a straight line drawn from a point in one of its sides.

VII. Let A B C be a triangle, and let B D be a straight line drawn to D, a point in A C between A and C, then, if A B be greater than A C, the excess of A B above A C is less than that of B D above D C.

VIII. In a triangle A B C, A D being drawn perpendicular to the straight line B D which bisects the angle B, show that a line drawn from D parallel to B C will bisect A C.

NOTE.—The percentage of marks requisite, in order that a candidate may be ranked of a particular grade, will be taken on the value of the above paper, omitting question VIII.

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COMMENCING 18th DECEMBER, 1871.

No. 17.

ECONOMY OF THE HOUSEHOLD.

(This Paper may be taken, instead of Euclid, by Female Candidates.)

TIME—ONE HOUR AND A HALF.

1. Give illustrations of the injurious effects of bad household management on (*a*) worldly prosperity, (*b*) health, and (*c*) the cheerfulness and comfort of the family.

2. (*a*) Describe the composition of milk. (*b*) Mention any circumstances, in the form of the pans in which milk is preserved, or in the temperature to which it is exposed, that promote the rising of cream.

3. (*a*) Compare, as to quality, butter churned in ten minutes with the butter from cream churned from half an hour to three-quarters of an hour. (*b*) Write a note on *the working of butter.* What use may be made, in this process, of a large sponge, covered with a clean cloth? and what is the advantage of using such a sponge?

4. (*a*) Point out the effect, in baking bread, of carefully sifting the bran out of the flour. (*b*) "It is very important, in cooking meats, to preserve their rich and nourishing juices as much as possible." How is this to be secured?

5. "Many housekeepers know not how to cook potatoes." Explain how this should be done.

6. Write a note on the cultivation of flowers.

7. Describe the influence of pure and unaffected piety.

PROVINCE OF ONTARIO.

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COMMENCING 18th DECEMBER, 1871.

No. 18.

NATURAL HISTORY, BOTANY, AND AGRICULTURE.

TIME—TWO AND A HALF HOURS.

(Special Paper—optional.)

1. Name the orders into which Mammalia are divided. What is the most striking peculiarity of the order of mammals to which the Kangaroo belongs? What common mammals are devoid of teeth in the fore part of the upper jaw?

2. In popular language, both the Whale and the Salmon are called fishes; why do naturalists place them in distinct Classes? What are these Classes?

3. What is ivory, and whence is it obtained?

4. How do the teeth of a Cat differ from those of a Sheep? What relation can be pointed out between the forms and kinds of teeth, and the habits of life, of each?

5. Arrange under their proper order, class, and sub-kingdom, the following animals: the dog, cow, kangaroo, lobster, snail, and sea-anemone.

6. Name and describe the principal sorts of flowers.

7. Define the technical terms in the following description of the sub-family to which one of our well-known trees belongs. "Flowers polygamous, some of them having no good pistils, mostly irregular and unsymmetrical. Calyx, bull-shaped, or tubular, 5-toothed. Petals, 4 or 5, with claws on the receptacle. Stamens, generally 7, long. Style one. Ovary, 3-celled, with a pair of ovules in each cell, only one or two ripening in the fruit; which becomes a leathery 3-valved pod, seeds very large, like chestnuts. Fine ornamental trees, with opposite palmate leaves, and flowers in thick panicles." What sub-family is thus described?

8. What elementary substances should the soil contain for the nourishment of plants?

9, What substances are absorbed and what exhaled by plants?

10. What is Caustic lime? Explain fully its action on soils.

11. What is the order in which crops should succeed each other? Give reasons for your answer.

PROVINCE OF ONTARIO.

EXAMINATION FOR FIRST CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 26th DECEMBER, 1871.

REV. GEORGE PAXTON YOUNG, M.A.,
REV. J. G. D. MACKENZIE, M.A.,
JAMES A. McLELLAN, ESQ., M.A.,
} *Examiners.*

No. 19.

ARITHMETIC.

TIME—THREE HOURS.

1. Six men start together to travel in the same direction round an island, 60 miles in circumference; their respective rates per day are 5, $6\frac{1}{4}$, $7\frac{1}{3}$, $8\frac{1}{4}$, $9\frac{1}{2}$, and $10\frac{1}{4}$ miles. In how many days will they all be together again?

2. A Note of $2,000, drawn at 60-days, payable at the Bank of Toronto, is discounted by a broker, at 2% a month; what rate of interest does he make on his money? Explain the analysis.

3. Show how to find the amount of a sum of money at Compound Interest, for a given time and rate.

4. City of Toronto 6% Debentures having six years to run, are offered for sale; what price shall I pay in order to realize 10% on my investment?

5. Define a logarithm; what is the log. of 2187 to base 3? Given log. 2 = ·301030, and log. 7 = ·845098, find log. of ·0035.

6. A man bought a farm for $5,000, and agreed to pay principal and interest in four equal annual payments; find the annual payment, interest being at 6%.

7. A., B., and C. form a partnership with a joint stock of $12,600; A's. stock continues in trade six months, B's. eight months, and C's. twelve months. A's. gain is $1,300, B's. $1,500, and C's. $1,800: what stock did each put in?

8. At what advance on cost must a merchant mark his goods so that after allowing 6% of his sales for bad debts, 7% of the *cost* for expenses, and an average credit of 6 months (money being worth 6%), he may make a clear gain of 15% on the first cost of the goods?

9. Find the present worth of $520.12½, due nine months hence, supposing 4 per cent. Stock to be at 92.

10. A Society collected among themselves a fund of £413 8*s.* 9*d.*, each person paying as many pence as there were members. Find the number of members.

11. How much less will it cost to fence 40 acres of land in the form of a square, than in the form of a rectangle of which the length is $2\frac{1}{2}$ times the breadth, the fence costing $2.25 per rod.

12. Find the radius of the greatest sphere that can be inscribed in a right cone whose height is 12 inches and base diameter 8 inches.

N. B.—Full work required; the bare answer to a question will count nothing.

PROVINCE OF ONTARIO.

EXAMINATION FOR FIRST CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS
PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE
COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 26th DECEMBER, 1871.

REV. GEORGE PAXTON YOUNG, M.A.,
REV. J. G. D. MACKENZIE, M,A., } *Examiners.*
JAMES A. McLELLAN, ESQ., M.A.,

No. 20.

EUCLID.

TIME.—THREE HOURS.

I. To describe a square that shall be equal to a given rectilineal figure.

II. A segment of a circle being given, to describe the circle of which it is the segment.

III. If the vertical angle of a triangle be divided into two equal angles by a straight line which also cuts the base, the segments of the base shall have the same ratio which the other sides of the triangle have to one another.

IV. In a right-angled triangle, if a perpendicular be drawn from the right angle to the base, the triangles on each side of it are similar to the whole triangle and to one another.

V. If four straight lines be proportionals, the similar rectilineal figures similarly described upon them shall also be proportionals.

VI. Draw a straight line so as to touch two given circles.

VII. Let A B C be a triangle, and from B and C, the extremities of the base B C, let lines B F and C E be drawn to F and E, the middle points of A C and A B respectively, then, if B F = C E, A B and A C shall be equal to one another.

VIII. Describe an equilateral triangle equal to a given triangle.

PROVINCE OF ONTARIO.

EXAMINATION FOR FIRST CLASS PROVINCIAL CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 26th DECEMBER, 1871.

REV. GEORGE PAXTON YOUNG, M.A.,
REV. J. G. D. MACKENZIE, M.A.,
JAMES A. McLELLAN, ESQ., M.A.,
} *Examiners.*

No. 21.

ALGEBRA.

TIME—TWO HOURS AND A HALF.

1. Multiply together the expressions,
$x^2 \sqrt{-1} - 1) - x(\sqrt{-1} + 2) - \sqrt{-1} + 1$, and, $x^2(\sqrt{-1} + 1) - x(\sqrt{-1} - 2) - \sqrt{-1} - 1$.

2. Solve the equation, $x^m - (a^2 - b^2)x^n = 4abx^{\frac{(m+n)}{2}}$

3. Solve the equation, $\sqrt{x+1} - \sqrt{x-1} = 2$. If r be the value of x which you obtain, substitute this value of x in the given equation, and show that it does, in point of fact, satisfy the equation.

4. Prove that $\frac{a-b}{b-c}$ is equal to $\frac{a}{a}$, or to $\frac{a}{b}$, or to $\frac{a}{c}$, according as the numbers, a, b, c, are in Arithmetical, or in Geometrical, or in Harmonical, Progression.

5. The equations, $x^2 + px + 3 = 0$, and. $x^2 + (p - 10)x - 7 = 0$, have a common root. Find their roots. (The value of p is not supposed to be known.)

6. Prove, that, if z be a quantity depending on two others, x and y, in such a manner, that when x is constant, z varies as y, and, when y is constant, z varies as x; then, when x and y both vary, z will vary as xy.

7. Three towns, A, B and C, are equally distant from one other, the distance between any two of them being x miles. A traveller P sets out from A to go through C to B, proceeding at first at the rate of m miles an hour. One hour and 24 minutes afterwards, a traveller Q sets out from A to go through B to C. After P has gone half the distance between A and C, he increases his rate of travelling by one mile in the hour; and, passing Q (who continues to travel at the same rate at which he started) half way between B and C, arrives at B 18 minutes after Q has reached C. Express x in terms of m.

8. Find four numerical quantities, the products of which, taken three together, are, 1, 8, 27, and 64.

9. Prove, that, if n be a whole number, either n^2 or $n^2 + 2$ is divisible by 3.

10. A and B are towns beside a river which runs at the rate of 4 miles an hour. A waterman rows from A to B and back again, and takes 39 minutes more to do it than if there had been no stream. The next day he does the same with another waterman, with whose help he can row half as far again; and they are now only 8 minutes longer than if there had been no stream. At what rate would the waterman row by himself without any stream.

11. Prove that $1^3 + 2^3 + 3^3 + \dots + n^3 = (1 + 2 + 3 + \dots + n)^2$, n being any whole number.

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Examiners.

No. 22.

HISTORY.

TIME—TWO HOURS.

1. Give a brief account of the Phœnicians, alluding more particularly to their Colonies, connexion with Sacred History, and intercourse with Greece.

2. Write a short account of the formation, proceedings, and dissolution of the Second Triumvirate.

3. Give a short account of the origin, duties, and history of the offices of Consul, Prætor, Censor, and Dictator.

4. Give some account of the Medici family, referring more particularly to their encouragement of Art and Letters.

5. Give the dates of the following, and mention contemporaneous events:—Death of Socrates; Defeat of Spartans by Philopœmen; Accession of Henry VIII; League of Augsburg; Impeachment of Warren Hastings; Death of Napoleon Bonaparte.

6. Write a short history of the Third Crusade, and describe the social effects of these Wars of the Cross.

7. State the design of the Quadruple Alliance. Date?

8. Sketch the career of William Pitt, and write brief notes on the other parliamentary orators and statesmen of his time.

9. Show by geneological table the descent of Queen Victoria from the House of Stuart.

10. (*a*) State what checks on the Royal authority existed, nominally at least, during the Tudor period, and show how they were evaded.
    (*b*) Mention aggressions on the Constitution made by James II.
    (*c*) When may the freedom of the Press be said to have commenced in England?

11. (*a*) Contrast the French and English Colonial Systems in Canada.
    (*b*) Give the particulars of Pontiac's conspiracy.
    (*c*) Give the date and leading incidents of Lord Durham's mission.

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No. 23.

ENGLISH GRAMMAR.

TIME—TWO HOURS.

1. Define RELATIVE PRONOUN, VERB IMPERSONAL (Proper and Improper), CONJUNCTIVE ADVERB.

2. Show to what extent we are to receive the statement that "the passive voice expresses passively the same thing that the active verb does actively."

3. Show how the Indicative and Potential Moods differ in their declarative force.

4. "The construction of English Infinitives is two-fold: (1.) Objective; (2.) Gerundial."—LATHAM. Explain fully and exemplify this statement.

5. Some Grammarians have given it as a rule that "Verbs Substantive govern the Nominative Case." Is this correct? Investigate the rule.

6. "Conjunctions connect not words, but prepositions." Show that these assertions can be maintained even with sentences like these: "John and Thomas carry a sack to market." "Three and three make six."

7. Parse the italicised words in the following sentences:—
   (a) He *fain had spoken* to her.—TENNYSON.
   Marcellus and myself,
   The *bell* then beating one, &c.—SHAKSPEARE.
   The ascending pile stood fixed her stately *height.*—MILTON.
   This scull has lain *you* in the ground these three years.—SHAKSPEARE.

8. Correct or justify the following, giving in each case your reason:—
   (a) The only officers are a treasurer and librarian who attend every Saturday evening.—*Brougham's Speeches*
   (b) Every door and window was adorned with wreaths of flowers.—*Macaulay.*
   (c) It is more than a twelvemonth since an evening lecture has been set up in this place.
   (d) The town contained more than one priest who, during repeated changes in the discipline and doctrines of the Church, had remained constant to nothing but his benefice.—*Macaulay.*

9. Explain the figures Hyperbaton, Apocope, Apostrophe, indicating the class to which each belongs.

10. What figures occur in the following:
    (a) Satan exalted sat, by merit raised
    To that bad eminence.—MILTON.
    (b) The old lion glaring with his whelpless eye.—TENNYSON.

11. What is meant by Service Metre and Alexandrines? Give a specimen of each.

12. Analyze the following:—
    From camp to camp, through the foul womb of night,
    The hum of either army stilly sounds,
    That the fix'd sentinels almost receive
    The secret whispers of each other's watch:
    Fire answers fire; and through their paly flames
    Each battle sees the other's umber'd face;
    Steed threatens steed, in high and boastful neighs,
    Piercing the night's dull ear.
    SHAKSPEARE.—*Henry V., Chorus Act IV.*

PROVINCE OF ONTARIO.

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No. 24.

EDUCATION.

TIME TWO HOURS.

1. What is the end of school government?
2. Briefly examine the question how far school government is derived from parental.
3. The different modes of school government are designated as those of force, authority and influence. State their characteristics and the qualifications requisite for their administration.
4. What is school management? Point out the qualities in a teacher which are essential to good management.
5. Admitting that "there is no escape from the use of punishment in schools," what means should be taken to reduce it to a minimum?
6. "The objects of study are knowledge, discipline, aspiration, efficiency." Briefly explain this statement.
7. What course would you pursue with seemingly incorrigible offenders?
8. Discuss the value of the following in school discipline:—demerit marks, reprimand, loss of privilege, confinement, corporal punishment, expulsion.
9. Show how you would explain to your pupils, (1) the distinction between the axioms and the postulates in Euclid, and between direct and indirect demonstration; (2) the methods of factoring trinomials, and the principles involved in the solution of a simple equation.
10. A celebrated scholar and educator is reported to have stated, in a recent lecture, that, "in our schools, too much is made of the memory, and too little of the reason." Illustrate this by reference to certain (too prevalent) modes of teaching.

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No. 25.

SCHOOL LAW OF ONTARIO.

TIME—ONE HOUR AND A-HALF.

[NOTE.—*Minimum qualifications for First Class Provincial Certificates.* Candidates are required "to be acquainted with the law and official regulations relating to Trustees, Teachers, Municipal Councils and School Inspectors."]

I. What are the respective powers of Public School meetings and Trustees in regard to :—
  (1.) Employing Schoolmasters and Assistant Teachers ?
  (2.) Selecting a school site ?
  (3.) Erecting a school-house and determining its size, cost, &c. ?
  (4.) Renting, repairing and cleaning school-house ; fencing and planting premises ?
  (5.) Providing (*a*) maps and apparatus, (*b*) library, (*c*) prizes, (*d*) Teacher's residence ?

II. In regard to Union School Sections, state respectively what are the powers and duties of :—
  (6.) Township Councils and the Reeves.
  (7.) Boards of School Trustees in cities, towns and villages.
  (8.) Public School Inspectors.

III. Explain the provisions of the law in regard to safe keeping and accounting for school money and property entrusted to :—
  (9.) County Councils and their officers (Treasurer and Sub-Treasurer).
  (10.) Public School Boards in cities, towns and villages.
  (11.) Rural School Trustees and their officers (Collector and Secretary-Treasurer).

IV. What are the powers and duties of Inspectors in regard to :—
  (12.) Public School meetings ?
  (13.) The apportionment and payment of the school fund ?

V. Summarize the School Law in regard to arbitrations.

VI. Explain the law and regulations in regard to Superannuated Teachers.

VII. Discuss briefly the principles upon which Free Schools rest, and what reciprocal duties their adoption involves (on the part of Trustees and Teachers) in regard to the quality of instruction given in them, and (on the part of the ratepayers) in regard to the attendance of children at them.

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No. 26.

NATURAL PHILOSOPHY.

TIME—TWO HOURS.

1. How is the velocity of a moving point estimated when the velocity is not uniform ?
2. If a uniformly accelerating force produces in a body a velocity of 10 feet in the second, through what space will it draw the body in 20 seconds ?

3. From a point on the earth's surface, a body is shot vertically upwards with a velocity of 320 feet in the second ; and, one second afterwards, another body is shot vertically upwards from the same point with the same velocity. Where does the latter body, in its ascent, meet the former in its descent ?

4. In a system of pullies, each of which hangs by a separate string, apply the principle of Virtual Velocities to determine the relation between the Power and the Weight when there is equilibrium.

5. In the previous question, should each Pully weigh 2 lbs., and should the weight of the pullies be taken into account, what power would be required to sustain a weight of 40 lbs., there being two moveable pullies in the system ?

6. The weight of a glass flask, filled with water is W ; of the same flask, filled with air, Y ; and of the same flask, when exhausted of air, X. Find the specific gravity of air, that of water being 1 ; W, X and Y, being known quantities.

7. State Torricelli's theorem regarding the velocity of efflux of a liquid from an orifice. Is the quantity of liquid discharged from an aperture in a given time actually as great as it should be according to th s theorem ? If not, explain the discrepancy.

8. *(a)* How is the intensity of the sound produced by a vibrating sonorous body affected by a change in the density of the surrounding medium ? *(b)* Does the velocity of sound in air depend at all on temperature ? *(c)* Does it vary with the pitch or strength of the sound ?

9. A B C D is a square ; and, at a point E, in the diagonal A C, is placed a particle to which are attached strings that pass over smooth pullies at the corners, A, B, C, D, of the table, and support weights represented in magnitude by the lines CE, DE, AE, BE, respectively. Show that the particle will be kept at rest.

10. Over a fixed smooth pully a string passes, to one end of which is attached a weight A of 10 lbs., and to the other a weight B of 12 lbs. The weight B descends, drawing up A. What velocity (the resistance of the air not being taken into account) does B acquire in a second ?

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No. 27.

ENGLISH LITERATURE.

TIME—TWO HOURS AND A HALF.

1. Write notes on Alcuin; the Earl of Surrey—referring particularly to the service rendered by him to English Poetry; Dr. Johnson—describing especially the peculiarities of his style; and Wordsworth.

2. Describe the "Scriptorium," its occupants, and their work.

3. Exhibit, from a literary point of view, the excellence of our English Bible.

4. Describe the *Arcadia; Castle of Indolence; Progress of Poesy;* and *Christabel*, and name their respective authors.

5. Write a brief account of English Serial Literature.

6. Give a sketch of Literary life in the Eighteenth Century.

7. State what you know of the Poems ascribed to the "Monk Rowley," and quote from them one line sufficient of itself to decide the question of their antiquity.

COMPOSITION.

Either of these subjects may be selected:—

The mutual relation and duties of a State and its Colonies.

Words—Facts—Principles; the ascending scale in education.

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No. 28.

ETYMOLOGY.

TIME—ONE HOUR.

1. State the constituent elements of the English language.

2. Compare words of Anglo-Saxon and Anglo-Norman origin for the purpose of explaining the preference given to either element in the choice of words.

3. Of words which have disappeared from our literary dialect mention (1st.) some which modern authors of note have endeavoured to revive; (2nd.) others which survive only as provincialisms; and (3rd.) others which pass for Americanisms, but which are really Old English.

4. Give the origin of the termination *ess* as a mode of expressing the feminine gender.

5. The termination *er* is common to adjectives of the comparative degree; some other adjectives, as *upper*, *under*, etc.; and certain pronouns, prepositions, and adverbs, as *either*, *over*, etc.: what common idea underlies this identity of termination?

6. Write brief etymological notes on the following:—
   (*a*) In like manner also that women adorn themselves in modest apparel, with *shamefacedness* and sobriety.
   1 *Tim.*, *ii.*, 9.
   (*b*) Woe *worth* the chase, woe *worth* the day!
   Sir Walter Scott.

   Come fate into the list,
   (*c*) And champion me to the *utterance.*
   Shakspeare.

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No. 29.

GEOGRAPHY.

TIME—ONE HOUR AND A HALF.

I. (1.) Define TROPICS; Horizon, (Sensible and Rational;) Zodiac; SOLAR and SIDEREAL YEAR.

(2.) Explain fully by diagram and otherwise the SOLAR and LUNAR ECLIPSES.

II. (1.) The Longitude of New York is 73° 59′ W; that of Madras 80° 22′ E: When it is 3 P.M. at New York, what o'clock is it at Madras?

(2.) In an observation taken in the Northern Hemisphere on the 17th October, the Sun's meridian altitude was found to be 47° 17′; declination for the day being 9°; chronometer time 3 P.M.: Ascertain the latitude and longitude.

III. Enumerate the principal Islands of the East Indian Archipelago, and mention their physical features and staple products.

IV. Give a full account of the British Colonies in Southern Africa.

V. Mention historical associations connected with the following places, giving dates where you can:—Avignon; Nantes; Lausanne; Valladolid; Florence; Ptolemais and Kars.

VI. (1.) Trace the course of the Mississippi, naming its tributaries and contiguous States, with their capitals.

(2.) Describe the political institutions of the United States.

VII. (1.) Give a sketch of the Champlain Valley.

(2.) Name the Counties of Ontario (with County Towns) bordering on the St. Lawrence.

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No. 30.

BOOK-KEEPING.

TIME—ONE HOUR AND A-HALF.

1. Explain the following terms :—Double Entry, Sundries, Charges a/c, Consignment a/c, Posting, Balancing.

2. Describe the Journal. What are Bills Payable ? Bills Receivable ? When are Bills P. and Bills R. a/cs. debited, and when credited ?

3. What entries would you make in the following cases :—
    (1.) You purchase merchandize, giving your notes, from A. B., C. D., and E. F. respectively.
    (2.) You purchase office furniture for cash.
    (3.) You sell goods to G. H., taking his note at 6 mo.

4. Journalize the following :—
    (1.) Sold goods to A. B. on a/c. $750.
    (2.) Bot. goods from C. D. $2,000, giving note at 6 mo. $1,200, cash $800.
    (3.) Sold goods to E. F. $800, receiving cash $350, and his note at 4 mo. for balance.
    (4.) A. B. fails and I receive only 55 cents on the $.
    (5.) Had E. F's. note discounted at 8 %.

5. What accounts will be affected (and how) by the following entries ?—
    (1.) Bot. a building for a business office $1,260 cash.
    (2.) Gave $250 for charitable purposes.
    (3.) John Smith draws on me for $800, I accept draft.
    (4.) I draw on James Brown for $900, and he accepts draft.

6. What is meant by arranging an a/c. ? What is the balance of the following a/c., and when is it due ?—

John Smith.

Dr.					Cr.
1871.			1871.		
March 1	To Sundries	$436	March 25	By draft at 60 days	$400
April 12	“ Goods	548	April 6	“ “ 30 “	650
July 16	“ “	312	June 20	“ Cash	200
Sept. 14	“ “	536	Aug. 3	“ “	84

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No. 31.

NATURAL HISTORY AND PHYSIOLOGY.

TIME—ONE HOUR AND A HALF.

1. What are the chief divisions of the animal kingdom?
2. Give the names of the classes into which vertebrated animals are divided, and the leading characteristics of each.
3. State the chief distinctive characters of the Ruminantia.
4. To what classes, orders and families do the following animals belong :—The Horse, Lion, Seal, Porpoise, Rat, Weasel, Ostrich, Sparrow?
5. Enumerate the orders of birds, and give the characteristics of the order Raptores.
6. What is meant by hybernation, and what animals hybernate?
7. Name the breathing organs of fishes, and describe their action.
8. Name six examples of Molluscous animals.
9. What animals are called "Zoophytes," and why?
10. Describe the changes which food undergoes in its transformation into blood.
11. Describe fully the circulation of the blood.
12. Name the different parts of the human eye, and fully explain their functions.

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No. 32.

BOTANY AND AGRICULTURE.

TIME—ONE HOUR AND A HALF.

1. What organs appear in the more perfect plants? In what two divisions are they comprised?
2. Distinguish weak climbing stems according to the mode in which they support themselves, the direction of their growth, and the nature of their clasping organs.
3. Describe the structure and functions of the leaf. State the parts which compose it. Give the leading divisions, and mention what secondary distinctions are required in specific descriptions.
4. What is the origin of the flower? What are its functions? Name its essential and its accessory parts, and the functions of each. Give the names of the circles and their component organs.
5. What is the fruit? Why are certain fruits more apt to fall off than others?
6. State the distinction between definite and indefinite infloresence, and give examples of the latter.
7. Of what does the food of plants consist? In what form is it found in the soil? How is it introduced into the plant? What inference may be drawn respecting the culture of the plant?
8. What is the origin of soils? How are they classified? State fully how you would conserve and improve them.
9. Under what circumstances would you employ the following substances as manures:—Lime, Gypsum, Ashes, Common Salt?
10. What soils are suitable for the following crops:—Beans, Peas, Potatoes, Turnips?
11. Enumerate the benefits which result from a judicious rotation of crops.

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No. 33.

CHEMISTRY AND CHEMICAL PHYSICS.

TIME—TWO AND A-HALF HOURS.

1. Show how to fix the zero point in graduating a common thermometer. What is a minimum thermometer? Explain the construction and action of such an instrument.

2. In the description given of the experiment of Ingenhausz (which consisted in coating rods with wax, heating one end, and observing the melting of the wax along the rods) it is usually stated, in hand-books of Natural Philosophy, that the wax melts most swiftly upon the best conductor; is this necessarily the case? If not, what is the physical circumstance which may render the statement erroneous?

3. You are required to test the relative radiating and conducting powers of two pieces of metal. How would you proceed?

4. State the laws of reflection and refraction of light. A luminous point being under water, trace the rays from it into air, and the direction in which it will be seen by an eye in a given position.

5. Find the position and magnitude of the image of a straight line, one inch long, placed perpendicular to the axis of a convex mirror of six inches radius, at a distance of two feet.

6. State what you know regarding the discovery of the Leyden Jar. How is the jar generally constructed? Explain its principle and use.

7. Describe how you would apply the current from a Voltaic battery to effect the ignition of gunpowder. How would you insure the ignition of gunpowder by a spark from a Leyden Jar?

8. How would you demonstrate experimentally the presence of its several important constituents in atmospheric air? Point out the individual functions of each in nature, and describe a method of preparing each in a state of purity.

9. Give a brief account of the composition and important properties of the substances obtained by burning Sulphur, Sodium, Carbon, Zinc and Phosphorus, in air or oxygen, and state what quantity of each of these bodies would be required to furnish one hundred grains of its product of combustion. *Equivalents:* Na. 23; Zn. 65·2; P. 31; S. 32; C. 12.

10. State the composition of the ordinary ores of iron, the chemical principles involved in their reduction, and the composition of cast-iron and steel.

Department of Public Instruction.

PROVINCE OF ONTARIO.

EXTRACTS FROM THE OFFICIAL REGULATIONS.

8. *Time and place of each Examination.*—The half-yearly examination of candidates for Second and Third Class Certificates hall be held in each County Town in such building as may be appointed by the Inspector, who shall give at least three weeks' ublic notice thereof, in such manner as he shall deem expedient. The examination of candidates for first-class certificates shall e held at the same place, on the Tuesday next after the close of the other examination; but all candidates for first-class certificates, who do not already possess second class Provincial certificates, shall be required to previously pass the examination for uch second class certificates.

9. *Proceedings at each Examination.*—The Inspector shall preside at the opening of the examination; and at 2 o'clock on he afternoon of the first day, in the presence of such of his colleagues as may be there, and of the candidates, he shall break the eal of the package of examination papers received for that examination, from the Education Department. He shall also break pen the seal of each additional packet of examination papers as required, in the presence of a co-examiner and of the candidates, e shall farther see that at least one examiner is present during the whole time of the examination, in each room occupied y the candidates. He shall, if desirable, appoint one or more of his co-examiners (1) to preside at the examination in any f the subjects named in the programme: (2) to read and report upon the answers as they are received.

DAYS AND HOURS OF EXAMINATION FOR SECOND AND THIRD CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, COMMENCING 18TH DECEMBER, 1871.

MONDAY, 18TH DECEMBER.

TIME OF EXAMINATION.	CLASS.	NO. OF PAPER AND SUBJECT.
From 2 p.m. to 4	Second	(1) Natural Philosophy.

TUESDAY, 19TH DECEMBER.

TIME OF EXAMINATION.	CLASS.	NO. OF PAPER AND SUBJECT.
From 9 a.m. to 10.30	Second	(2) Book-keeping.
" 10.45 to 12 noon	Second and Third	(3) Etymology.
" 1.30 p.m. to 3.45	Second and Third	(4) History.
" 3.50 to 4.30	Second and Third	(5) Dictation and Reading.*

WEDNESDAY, 20TH DECEMBER.

TIME OF EXAMINATION.	CLASS.	NO. OF PAPER AND SUBJECT.
From 9 a.m. to 10.30	Second	(6) Education.
" 10.40 to 12.10	Second	(7) School law.
" 9 to 11.30	Third	(8) Education and School Law.
" 1.30 p.m. to 3.30	Second and Third	(9) Geography.
" 3.35 to 4.30	Second and Third	(5) Reading.

THURSDAY, 21ST DECEMBER.

TIME OF EXAMINATION.	CLASS.	NO. OF PAPER AND SUBJECT.
From 9 a.m. to 12 noon	Second	(13) Arithmetic and Mensuration.
" 9 a.m. to 12 noon	Third	(14) Arithmetic.
" 1.30 p.m to 4	Second and Third	(15) Grammar.

FRIDAY, 22ND DECEMBER.

TIME OF EXAMINATION.	CLASS.	NO. OF PAPER AND SUBJECT.
From 9 a.m. to 11	Second	(10) Chemistry.
" 11.10 to 12.40	Second	(11) Algebra.
" 2 p.m. to 4	Second	(12) Botany and Physiology.

SATURDAY, 23RD DECEMBER.

TIME OF EXAMINATION.	CLASS.	NO. OF PAPER AND SUBJECT.
From 9 a.m. to 11.30	Second	(16) Euclid.
" 9 a.m. to 10.30	Second	(17) Economy of the Household. (For Female Candidates.)
" 1.30 p.m. to 4	Second	(18) Optional Paper on Natural History, Botany and Agricultural Chemistry.

*Paper No. 5 (Reading) is not to be seen by the candidates.

AYS AND HOURS OF EXAMINATION FOR FIRST-CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, COMMENCING 26TH DECEMBER, 1871.

TUESDAY, 26TH DECEMBER.

TIME OF EXAMINATION.	NO. OF PAPER AND SUBJECT.
rom 9 a.m. to 12 noon	(19) Arithmetic and Mensuration.
" 1.30 p.m to 4.30	(20) Euclid.

WEDNESDAY, 27TH DECEMBER.

TIME OF EXAMINATION.	NO. OF PAPER AND SUBJECT.
rom 9 a.m. to 11.30	(21) Algebra.
" 1.15 p.m. to 3.15	(22) History.
" 3.25 to 5.25	(23) Grammar.

THURSDAY, 28TH DECEMBER.

TIME OF EXAMINATION.	NO. OF PAPER AND SUBJECT.
rom 9 a.m. to 11	(24) Education.
" 11.10 to 12.40	(25) School Law.
" 2 p.m. to 4	(26) Natural Philosophy.

FRIDAY, 29TH DECEMBER.

TIME OF EXAMINATION.	NO. OF PAPER AND SUBJECT.
rom 9 a.m. to 11.30	(27) English Literature and Composition.
" 11.40 to 12.40	(28) Etymology.
" 2 p.m. to 3.30	(29) Geography.
" 3.40 to 5.10	(30) Book-Keeping.

SATURDAY, 30TH DECEMBER.

TIME OF EXAMINATION.	NO. OF PAPER AND SUBJECT.
rom 9 a.m. to 10.30	(31) Natural History and Physiology.
" 10.40 to 12.10	(32) Botany and Agriculture.
" 1.30 p.m. to 4	(33) Chemistry and Chemical Physics.

N.B.—Where there are candidates in Music and Linear Drawing, arrangements can be made for an evening

PROVINCE OF ONTARIO.

ANSWERS TO QUESTIONS.

EXAMINATIONS FOR SECOND AND THIRD CLASS CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

COMMENCING 18th DECEMBER, 1871.

ANSWERS TO QUESTIONS IN ARITHMETIC.

THIRD CLASS.

1.—(1.) £47 12*s.* $6\frac{1}{2}$*d.*
(2.) £621 13*s.* 7*d.*
2.—Book-work.
3.—$1\frac{1}{4}$.
4.—$11,056·10.
5.—$6\frac{3}{4}$.
6.—$4\frac{13}{14}$.
7.—$80\frac{11}{14}$.
8.—$8·76.
9.—$250.
10.—$391·$32\frac{1}{2}$.

SECOND CLASS.

1.—Book-work.
2.—14.
3.—$41\frac{3}{17}$.
4.—$14\frac{5}{6}$ months.
5.—A., $9\frac{3}{8}$; B., $7\frac{1}{2}$; C., $8\frac{1}{8}$.
6.—$593·70.
7.—6, 15, 75.
8.—$39·$94\frac{4}{9}$.
9.—$12,375.
10.—$16\frac{1}{5}$ acres.
11.—216, 162.
12.—7475 multiplied by 3·1416.

ANSWERS TO QUESTIONS IN ALGEBRA.

SECOND CLASS.

1.—$a^{64} - x^{64}$.
2.—$x^2 - 2x + 3$.
3.—$\frac{14 - 12x}{4x^2 - 1}$.
4.—$\frac{7}{4}$.
5.—$\frac{1}{14}$.
6.—$x = 7$, $y = 5$.
7.—40.
8.—2700.
9.—Text-book (Sangster), art. 87, page 67.
10.—Text-book, art. 76, page 49.

ANSWERS TO QUESTIONS IN NATURAL PHILOSOPHY.

SECOND CLASS.

1.—See Text-book (Sangster).
2.—Text-book.
3.—The examiners must judge of the answers here submitted.
4.—The direction of the line will be C A, and its magnitude 2 C A.
5.—$2\frac{1}{2}$ lbs.
6.—Text-book, art. 221.
7.—Text-book, note, art. 221.
8.—207,360 lbs.
9.—Text-book, art. 236 ; and note 2, art. 236.
10.—The weight of 160 × 3·1416 cubic feet of water.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 1.

BOOK-KEEPING.

TIME, ONE HOUR AND A HALF.

1. Rule paper for a Cash-book, and enter in it as many of the following transactions as should be placed there

June 1,	In hand	$2169.46
“ 1,	In bank	132.52
“ 2,	Paid into bank	2000.00
“ ‘	Paid John Lynce	104.53
“ 3,	Paid Ronald Jukes, (cheque)	594.70
“ ‘	Allowed by Ronald Jukes, (discount)	10.30
“ 4,	Received of W. Ansted	190.00
“ 7,	Bought of J. McKenzie, goods.	1269.72
“ 10,	Accepted draft of J. McKenzie at three months	1269.72
“ “	Received of Jas. Brown	96.00
“ “	Hector Murray paid into my acc't at bank	800.00

2. Why is Book-keeping by Double Entry so called?
3. (*a*) What check on the correctness of the books is furnished by double entry?
   (*b*) How far is this check incomplete?
   (*c*) Has the system any further advantages?
4. Rule paper for a Journal and journalize the transactions in question 1.
5. Rule paper for a Ledger, and post into it, from the Journal made in answer to the last question.
6. Describe the mode of balancing a Ledger, giving an account of all the transfers which must be made, and stating, when it is possible, to which side each balance will be transferred.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 2.

ETYMOLOGY AND SPELLING.

TIME—ONE HOUR AND A QUARTER.

1. Correct, where necessary, the spelling of the following words :—paroxysm, miniature, mischevious, delapidate, alkemy, abscess, harpsicord, acheive, yoeman, beverage, obliquy, catiff.

2. Attach roots to the following prefixes, exhibiting, when possible, change made in the prefix for the sake of euphony :—ad, re, inter, trans, con, in, syn, amphi, hyper, sub.

3. Mention prefixes, each in combination with some word, which denote *negation* and *destitution* in place or time.

4. Give words in which the following affixes appear, and state the force of each affix :—" ster," " mony," " ric," " ion," " ency," " tude."

ADDITIONAL FOR SECOND CLASS CANDIDATES.

5. Give the adjectives of Latin derivation corresponding to the following nouns :—Dog, head, house, friend, step, light, law, rest.

6. Trace the following to their Greek roots :—Rhetoric, crypt, nautical, cosmogony, ephemeral, asteroid, polity, telegraph.
7. Give words—two in each case—derived from these Latin roots :—Faber, fruor, integer, licet, plico, salio, voveo.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 3.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

[*Candidates for Third-Class Certificates will confine themselves to the first ten questions of this paper. Candidates for Second-Class Certificates will omit questions* 1, 2, 7, and 10.]

1. Give an account of the battle of Salamis.
2. Give a sketch of the Third Punic War.
3. Give an account of the First Crusade.
4. Write brief historical notes on Darius Hystaspes, Coriolanus, and Charles Martel.
5. When did the Romans first land in Britain, and when did they finally leave it? Give a sketch of the career of Agricola in Britain.
6. Give a sketch of the career of John Hampden.
7. Narrate the principal events in the reign of James II. of England.
8. Under what circumstances was the Province of Quebec divided into Upper and Lower Canada? Under what circumstances was a union of the Provinces again brought about? Mention some important features of the new constitution of United Canada, as embraced in the Act of Union.
9. What led to the American declaration of war in 1812 against Great Britain? Sketch the campaign of 1812.
10. Give an account of the administration of Lord Metcalfe in Canada.

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11. Explain how Athens fell under the rule of the Thirty Tyrants? How was their rule brought to an end?
12. What led Pyrrhus, King of Epirus, to carry his arms into Italy? Give a sketch of his wars with the Romans.
13. Under what circumstances was a Moorish empire established in Spain? What was the last Spanish province of which the Moors retained possession? Give some account of the final extinction of the Moorish power in the Peninsula.
14. Describe the social condition of England under the Normans.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 4.

READING AND DICTATION.

As an exercise in Reading, the following selections from the Fifth Book may be used for all the candidates :—

Prose.—Lord Palmerston on the defence of Canada, page 372. "The honourable gentleman says —— has supposed."

Poetry.—The Queen, page 185. Last stanza.

For Dictation, the following may be taken :—Fifth Book, page 207. "That he should have been minutely," &c., to end of extract.

PROVINCE OF ONTARIO

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 5.

EDUCATION.

TIME—ONE HOUR AND A HALF.

1. Give a general description of the interior of a rural school house for fifty pupils, as regards dimensions, number of rooms, furniture and apparatus.
2. Sixty children who have never before assembled together are placed under your care for the first time; how would you proceed to organize the school?
3. Should you use text books in beginning a subject with young children? Give reasons.
4. Show how you would begin the following subjects: Grammar, Composition, History.
5. Draw up notes of a lesson on the following subjects: (1) *The Sheep*; (2) *Salt*; (3) *Self-help*.
6. Show to what extent you consider the "lecturing system" may be employed in a school.
7. Give an outline of the method in which you would combine *lecturing* and *questioning* in education.
8. Point out any common defects in teaching Arithmetic.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 6.

SCHOOL LAW OF ONTARIO.

1. Give examples of the four classes of persons disqualified from holding the office of Public School Trustee.

2. Illustrate five out of the seven ways in which the office of Public School Trustee may be vacated.

3. Mention some of the provisions of the law in regard to the (1) erection, (2) repairs, and (3) use of the School House of a Section.

4. Distinguish (if any difference exist—and if so, what?) between the powers and duties of a Public School Meeting, and those of Trustees in regard to (1) the employment of a Teacher, (2) the purchase of Maps, Apparatus, (3) Library and Prize Books, and (4) the use of authorized, or unauthorized, Text Books.

5. What are the duties of a Secretary-Treasurer, and what penalties (if any) attach to the non-performance of duties, or faithlessness in the discharge of them?

6. State where only can "inequality of assessment" arise; and what are the provisions of the law in regard to an "undivided lot"?

7. Summarize the difference between the powers and duties of Masters and Assistant Masters (if any exist) in regard to (1) the "General Principles of School Government," (2) "Exercise of Discipline," (3) "Suspension" and "Expulsion" of Pupils, and (4) "Modes of Teaching."

8. State what is the essential difference in the principle on which prizes are given on the authorized "Merit Card" System, and that of awarding them on the result of a Competitive Examination. Give illustrations of the effects of each principle.

9. Explain fully the provisions of the law and regulations in regard to Superannuated Teachers.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 7.

EDUCATION AND SCHOOL LAW.

TIME—TWO AND A HALF HOURS.

1. What is education? How does it differ from instruction?
2. What is meant by the organization of a school?
3. How would you proceed to organize a school assembled for the first time?
4. Give notes of an *introductory* lesson in fractions.
5. How would you describe the nature of a map to a class beginning Geography?
6. Illustrate the maxim "The Teacher makes the school."
7. Rapidity and indistinctness are common faults in reading; how are they to be corrected?
8. State the principal duties of Public School Teachers, as laid down by Statute Law.
9. What is the general principle on which discipline is to be administered and maintained in a school by a teacher, as laid down in the Official Regulations.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE
COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 8.

GEOGRAPHY.

TIME—TWO HOURS.

Second Class will omit questions 7 *and* 8.

1. Define EQUATOR, ECLIPTIC, TROPICS, PLANET, ORBIT, CHANNEL, SOUND.

2. Name the Peninsulas of Europe and North America, the Southern States of the American Union, with their capitals, and the countries of South America on the Pacific Coast.

3. Give the boundaries and chief physical features of Ireland.

4. What portion of the British Dominions is on the Continent of South America? Name its rivers and towns.

5. Into what bodies of water do the following rivers discharge themselves: Alabama, Saskatchewan, Columbia, Restigouche, Tyne, Shannon, Vistula, Dnieper, the largest river of Europe, and the only Scottish river of importance flowing west.

6. State accurately the position of the following: Solway Firth, Heligoland, The Naze, Oporto, Lofoden Isles, Lake Wener, Cape Spartivento, Isthmus of Perekop, Taganrog, Caraccas, Pensacola, Cape Mendocino.

7. What Capes project from the East Coast of North America? What island North of Northumberland Strait? What States bound Lake Michigan? What two rivers form the Ohio? What countries North of Brazil? What group of islands East of Patagonia? The only navigable river in Denmark? What gulf South of France?

8. Give the boundaries of the Province of Ontario, the number of its counties, and its frontier cities and towns.

ADDITIONAL FOR SECOND CLASS.

9. What islands West of Morocco? Most Easterly Cape of Africa? What countries border on the Caspian Sea? What islands East of Borneo? What countries comprised in Turkey in Asia?

10. State what you know of the Indian tribes that occupy the area of British North America.

11. Name the Counties of Ontario (with the County Towns) bordering on the St. Lawrence.

12. Draw a map of Italy and Sicily.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 9.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. Prove the rule for finding G. C. M. of two numbers.

2. In the *Globe* of 21st April gold is quoted at $111\frac{1}{4}$. Find discount % on greenbacks.

3 I invest $13450 in stock of Bank of Commerce at $134\frac{1}{2}$, the half yearly dividends being $4\frac{1}{2}$ %. Find my annual income from the investment.

4. A farmer sold his crop of wheat in 1871 for 8 % more than he obtained for his crop of the preceding year; he received for both crops $2600; how much did he get for his crop of 1870?

5. Reduce to simplest form $\frac{3\frac{3}{4}}{6\frac{1}{2}}+\frac{5\frac{3}{4}-1\frac{1}{5}}{5\frac{3}{4}+1\frac{1}{5}} \times 5\frac{9}{26}-3\frac{9}{16}$

6. A grocer has three kinds of tea, costing 30, 45, and 60 cents a lb. respectively; what quantities of each must he take to form a mixture of 144 lbs. worth 40 cents a lb.?

7. A commission merchant sold a consignment of goods on 3 % cent commission, and was instructed to invest (on 2 % commission) in other goods, the commission for both transactions to be deducted in advance. His entire commission was $265. Find value of the goods he purchased.

8. Find cost of papering a room 29 feet 6 inches wide, 36 feet 6 inches long, and 13 feet 6 inches high, with paper $2\frac{3}{4}$ feet wide, and costing $2·20 per piece of 12 yards long, the parts not requiring paper making up $\frac{1}{5}$ of whole surface.

9. Two persons travelling together agree to pay expenses in the ratio of 7 to 5. The first (who contributes the greater sum) pays away on the whole $103·20, the second $63·40. What must one pay the other to settle the affair according to agreement?

10 The sides of a triangle are 30, 40, and 50 respectively. Find the area of the triangle formed by joining the middle points of these sides.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 10.

ARITHMETIC.

TIME—THREE HOURS.

1. The demand of 10 hours' pay for nine hours' work is equivalent to a demand of what increase % in wages?

2. What number divided by $(\frac{2}{19}+\frac{1}{13})\div(3-\frac{1}{3})\times(\frac{1}{3}+\frac{1}{5})$ will give $\frac{3}{14}$ of $\dfrac{4\frac{5}{9}}{6\frac{1}{6}}$ of $\dfrac{6\frac{8}{11}}{11\frac{5}{7}}$ of 247?

3. Find amount of following account:—448 lbs. butter at 23 cents, 436 lbs. cheese at $9\frac{1}{4}$ cents, $240\frac{3}{4}$ lbs. lard at $11\frac{3}{8}$ cents, $254\frac{7}{8}$ lbs. tallow at $13\frac{1}{2}$ cents, $40\frac{1}{2}$ dozen eggs at $16\frac{2}{3}$ cents, 15 bbls. salt at $1·40, and $481\frac{11}{16}$ lbs. ham at $12\frac{1}{2}$ cents.

4. A bankrupt owes four creditors as follows:—A. $2500, B. $3300, C. $4200, and D. $4000; his property is worth $10500; what does each creditor receive?

5. A lumber merchant bought 106250 feet of lumber at $14\frac{3}{8}$ per M., and retailed it at $1·75 per C. Find his gain.

6. Find expense of plastering a room 20 feet long, $18\frac{1}{4}$ feet wide, and $11\frac{1}{8}$ feet high, at 18 cents a yard.

7. If 25 men build a wall 15 ft. high, 2 ft. thick, and 50 ft. long, in 12 days of 9 hours each, how many hours per day must 40 men work to build a wall 60 feet long, 3 feet thick, and 20 ft. high in 25 days?

8. How much water must be mixed with 600 gallons wine, at $2·50 a gallon, in order to make the mixture worth $2 per gallon?

9. If $120 gain $5·84 in 126 days, find the gain in 360 days.

10. A merchant bought 500 bls. of flour at $6·25 a bl., on a credit of 8 months. He sold it at $6·50 a bl. on a credit of 4 months. What was his net cash gain, money being worth 12%?

PROVINCE OF ONTARIO

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 11.

ENGLISH GRAMMAR.

TIME—TWO AND A HALF HOURS.

[*Second Class will omit* 1, 4, 6, 7, *and* 11.]

1. Name the four great divisions of Grammar, and state the province of each.

2. Define CASE, PERSON, VOICE, MOOD, and TENSE.

3. Form abstract nouns from the following adjectives: pure, brief, slow, dear, intricate.

4. Name and distinguish the plurals of nouns which have two forms of the plural with different signification.

5. Write the plurals of the following: staff, potato, canto, grotto, attorney, seraph, cousin-german, medium, stamen, appendix, thesis, chrysalis.

6. Of the following adjectives compare such as are capable of comparison: cool, late, happy, perpendicular. many, triangular.

7. Name the distributive and the indefinite pronouns.

8. How is the verb inflected? Name the moods, and state the force of each.

9. Quote the rules of syntax which the following sentences are severally intended to exemplify:
   (*a*) Give *us* this *day* our daily *bread*.
   (*b*) The youth of this country *are* well educated.
   (*c*) The horse and the man *that* we met.

10. Parse the following sentence, and change the active into the passive construction:
    "His love of change drove him a pilgrim to the Holy Land."

11. Analyze the following: "Stimulated in turn by their approbation, and by that of better judges, he turned to their literature with redoubled energy."

ADDITIONAL FOR 2ND CLASS.

12. Give rules for the proper use of "shall" and "will."

13. Form or quote sentences to illustrate:
    (1.) The restrictive and the connective force of the relative pronoun.
    (2.) The twofold form of the cognate object.

14. Examine the correctness of the following, giving, in each case, your reason for retaining or altering the construction:

"The nations not so blessed as thee
Must in their turn to tyrants fall."—*Thomson*.
"In reality more than one principle has been contended for at one time."—*Arnold*.
"Every street and square in Dresden was by this time crowded with troops."—*Alison*.
"At an hour
When all slept sound, save she who bore them both."—*Rogers*.

15.—Analyze the following:

"Fancy had cast a spell upon the place
And made it holy; and the villagers
Would say that never evil thing approached
Unpunish'd there. The strange and fearful pleasure
That filled me by that solitary spring
Ceased not in riper years; and now it woke
Deeper delight and more mysterious awe."—*Southey*.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 12.

PRINCIPLES OF VOCAL MUSIC AND LINEAR DRAWING.

TIME—

NO.	VALUE.	
1.	iv.	Explain the terms "acute" and "grave," applied to the scale in music.
2.	xxv.	How would you explain to a class the duration of notes or rests ?
3.	xxv.	State the most important points to be observed in singing.
4.	x.	Explain the terms "Adagio," "Andante," "Allegro," "Presto," "Pause."
5.	xi.	(*a*) What is a fifth ? (*b*) Do two notes a fifth apart occupy similar or dissimilar positions on the stave ? (*c*) What is an imperfect fifth ?
6.	ix.	Explain OBLONG, RHOMBOID, DIAGONAL.
7.	xv.	Delineate a kite with mathematical accuracy.
8.	x.	Show by a drawing that triangles on the same base, and between the same parallels, are equal.
9.	xxx.	Why does not a bridge, when properly built, fall in ? Make a drawing of such a bridge.
10.	xi.	Distinguish between an oval and an ellipse.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th JULY, 1872.

No. 13.

CHEMISTRY.

TIME—TWO HOURS.

1. Define the following terms used in chemistry, and give one or more examples of each :—acid, alkali, base, oxide, and salt.

2. Explain clearly what is meant by *chemical equivalents.*

3. Mention the principal varieties of carbon, its compounds with oxygen, and the properties of either of these compounds.

4. Explain the theory of the bleaching properties of Chlorine. It is not used for bleaching straw, wool, silk, feathers, &c. ; how are these substances bleached ?

5. What is Calcium ? State the composition of limestone, and the change which it undergoes when burnt. What is the composition of Hydraulic Cement ?

6. Name the principal ores of iron, and describe the method of obtaining iron from its ores.

7. State generally the composition of the following substances :— galena, cinnabar, calomel, vermilion, and German silver.

8. Give the properties of oxygen, and describe any method of preparing it.

9. Give the composition of atmospheric air; the uses of each of its constituents in nature. Is it a chemical compound or a mechanical mixture ? Give reasons.

10. Describe the preparation of hydrogen and give its principal properties.

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No. 14.

ALGEBRA.

TIME, TWO HOURS.

1. Multiply together the expressions,

$$\frac{2x-3}{7y^2+8x}, \qquad \frac{2x+3}{x^2+x+1}, \qquad \frac{49y^4-64x^2}{12x^2-27}, \qquad \frac{3(x^3-1)}{x-1},$$

presenting the result in the simplest form.

2. Investigate a rule for finding the Highest Common Measure of two algebraical expressions.

3. Find the Highest Common Measure of

$$x^5+2x^3-x^2-2,$$

and,

$$x^4+x^3+2x^2+2x.$$

4. Find x from the equation,

$$\frac{x(1+m)-3}{2} - \frac{2(m+x)-6}{3} - \frac{3xm-4m}{6} = 0$$

5. Find x from the equation,

$$\frac{x}{1-x} - \frac{m}{1+x} - \frac{x(1+x)-m(1-m)}{1-x^2} = 0$$

6. Find y from the simultaneous equations,

$$ax+by=c$$

$$mx+ny=r$$

What is the meaning of the result when both of the expressions, $mc-ar$ and $mb-an$, are zero ?

7. Find x and y from the simultaneous equations,

$$\frac{6}{y}+\frac{5}{x-1}=2. \qquad \frac{18}{y}+\frac{10}{x-1}=1.$$

8. Prove that, when n is an odd number, x^n-a^n is divisible (without remainder) by $x-a$.

9. There is a number of two digits, which exceeds four times the sum of its digits by 6. If the digits were inverted, the number would exceed 6 times the sum of its digits by unity.

10. A traveller leaves A for B at the same time that another leaves B for A, and goes at the rate of 3 miles an hour till he has performed half his journey ; then, after resting for an hour, he proceeds at the rate of 4 miles an hour. The other traveller goes at the rate of 4 miles an hour till he has accomplished one-third of his journey ; then, after resting for 40 minutes, he proceeds at the rate of 3 miles an hour, and reaches A at the same time that the former traveller arrives at B. Find the distance between A and B.

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No. 15.

BOTANY AND PHYSIOLOGY.

1. What are the different parts of a plant? Describe the functions of each part.

2. State *all* the ways by which an Exogenous stem may be distinguished from an Endogenous.

3. Describe the functions of leaves. What is the cause of their fall in Autumn? Draw and describe a maple leaf.

4. Name the different parts of a flower, and describe the use of each part. Draw a diagram showing a stamen and a pistil and the parts of each.

5. What is the fruit? Why do some fruits fall from the stem more easily than others?

6. Of what does the food of plants consist? In what forms and by what organs is it taken up, and how assimilated? Name the substances inhaled and those exhaled by plants and the uses of each in the economy of nature.

7. Describe fully the process of grafting. What conditions should be observed as to species, constitution, adhesion of parts, &c.?

8. Describe the organs of respiration.

9. Show clearly the effects of impure air upon the brain and nervous system.

10. State, with reasons, the kind of food suitable for the inhabitants of high Southern latitudes.

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No. 16.

EUCLID.

TIME, $2\frac{3}{4}$ HOURS.

1. Define a *straight line*, a *plane rectilineal angle*, a *right angle*, a *Gnomon*. Enunciate Euclid's Postulates.

2. If from the ends of the side of a triangle there be drawn two straight lines to a point within the triangle, these shall be less than the other two sides of the triangle, but shall contain a greater angle.

3. If two triangles have two angles of the one equal to two angles of the other, each to each, and one side equal to one side, namely, either the sides adjacent to the equal angles, or sides which are opposite to equal angles in each; then shall the other sides be equal, each to each; and also the third angle of the one equal to the third angle of the other. (*Take the case in which the assumed equal sides are those opposite to equal angles.*)

4. In every triangle, the square on the side subtending an acute angle is less than the sides containing that angle, by twice the rectangle contained by either of these sides, and the straight line intercepted between the perpendicular let fall on it from the opposite angle, and the acute angle. (*Take the case where the perpendicular falls within the triangle.*)

5. If a straight line be divided into any two parts, the squares on the whole line, and on one of the parts, are equal to twice the rectangle contained by the whole and that part, together with the square on the other part.

6. Prove that, if a straight line AD be drawn from A, one of the angles of a triangle ABC, to D, the middle point of the opposite side BC, BA+AC is greater than 2 AD.

7. Let the equilateral triangle ABC, and the triangle ADB, in which the angle ABD is a right angle, be on the same base AB, and between the same parallels AB and CD. Prove that $4\ AD^2 = 7\ AB^2$.

8. From D, a point in AB, a side of the triangle ABC, it is required to draw a straight line DE, cutting BC in E, and AC produced in F, so that DE may be equal to EF.

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No. 17.

ECONOMY OF THE HOUSEHOLD.

(This Paper may be taken, instead of Euclid, by Female Candidates.)

TIME—ONE HOUR AND A HALF.

1. Illustrate the importance of "intelligence, economy, and industry" in the management of a household.

2. Describe the best arrangements for the dairy, as to the building or room used for the purpose; temperature; and pans to receive the milk. Why should not the milk-pans be set on the bottom of the cellar?

3. *(a)* In churning, what temperature may be expected to give "the greatest quantity of butter of the best quality"? (*b*) What effect is produced by the application of warm water and by violent churning? (*c*) Describe the process of working the butter, and show that "a large sponge, covered with a clean cloth, may be used to great advantage."

4. (*a*) Explain the action of the *yeast* in making bread. (*b*) What is said of the bran with reference to nutritious property?

5. "If meats are to be boiled, they should be put at once into boiling water; if they are to be roasted, they should be exposed at once to a quick fire." Why should this be done?

6. Describe the best method of boiling potatoes.

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No. 18.

NATURAL PHILOSOPHY.

TIME—TWO HOURS.

1. Describe the three kinds of levers, and give two examples of each kind.

2. In a bent lever A F B, whose fulcrum is F, the arms A F and F B are straight, and inclined to one another at an angle A F B, which is such, that the perpendicular let fall from A on B F produced is equal to two-fifths of A F. Also, F B=2 F A. When F B is horizontal, find the force, which, acting vertically, at A, will balance a force of 100 lbs. acting vertically at B.

3. Describe the differential screw.

4. The base A C, of an inclined plane A B, is 8 feet; and the vertical height B C, 6 feet. A weight W, of 100 lbs., is sustained on A B by a force P, acting parallel to A B. Find the reaction of the plane against W (or the pressure of W on the plane in a direction perpendicular to the plane).

5. Describe the essential parts of the high pressure steam engine.

6. The triangle A B C has the angle A C B a right angle; A C=3 feet, and B C=8 feet. From A let the straight line A D be drawn to D, the middle point of B C; and suppose that a particle at A is acted on by three forces represented in magnitude and direction by the lines A B, A D, A C respectively. Find the length of the line which represents the sum of the resolved parts of these forces in the direction A C; and also the length of the line which represents the sum of their resolved parts in a direction perpendicular to A C; and deduce the magnitude of the resultant of the three forces.

7. In sliding friction, what is the relation between the friction and the pressure? How does friction depend on the extent of the surfaces in contact, and on the velocity of motion?

8. A hollow cube is filled with water, the weight of the water being 1000 oz. Find the entire pressure on the interior surface of the vessel, when the cube rests with one of its faces on a horizontal plane. Would the pressure be different if the vessel were in a different position? If so, why?

9. Describe the action of the syphon. If the syphon be acting under the receiver of an air-pump, and the air be gradually exhausted, when will the fluid cease to run?

10. A glass tube, open at one end, and having a quantity of air in its upper and closed end, is held vertically with its mouth in a vessel of mercury which is exposed to the atmospheric pressure. The mercury rises in the tube to the height of x inches above the surface of the fluid in the vessel; and the elasticity of the confined air is then 9-10ths of that of the external air. If the height of the barometric column be 30 inches, find the value of x.

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No. 19.

NATURAL HISTORY, BOTANY, AND AGRICULTURAL CHEMISTRY.

TIME—TWO AND A HALF HOURS.

(Special Paper—optional.)

1. Give some account of the whalebone whale. Name the trade products we obtain from it, stating the purposes which each of these serves to the animal.
2. What is meant by Passerine birds? Draw the beak and foot of one of them, and give an account, from your own knowledge, of some of the birds belonging to this group.
3. What is meant by the term *insects?* Describe the transformation of a silkworm.
4. Describe the structure and mode of growth of the exogenous and the endogenous stems.
5. Describe a maple leaf, with special reference to its form, parts and venation.
6. Pulse Family, order Leguminosæ,—how distinguished? Give examples of its usefulness to man.
7. Name the different kinds of manures, and state under what circumstances each should be used.
8. On what fact is the theory of the rotation of crops founded? Give a rotation suitable for light lands.
9. "The proper care of stock is vital to the success and interests of the farmer"—state the principal things necessary to the proper care of stock.
10. What plants are used in arts and manufactures, and which of them are cultivated in Canada?

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No. 20

ARITHMETIC AND MENSURATION.

TIME, THREE HOURS.

1. A company with a capital of \$2,000,000, paid 7% to the share-holders: afterwards a new issue of Stock was ordered, and the profit to be divided became six times as much as at first, yet the Co. could pay only 3% dividends: find amount of new Stock issued.

2. A produce dealer bought grain by measure and sold it by weight gaining thereby 2% in the No. of bushels: he sold at a price 6% in advance of his buying price, and received the sum of \$5000. What did the grain cost him?

3. Bought 336 gallons of molasses at 37½ cents a gallon, and paid \$7·50 for freight, if 5% be allowed for leakage, 4% of the sales for bad debts, and one per cent of the remainder for collecting, what selling price per gallon will yield me a net gain of 25% on the whole cost?

4. A grocer buys tea at \$1·20 a pound, and also some at 80 cents and mixes them in such a proportion, that by selling the mixture at \$1·05 a pound, he gains 20%, in what proportion did he mix the teas?

5. A debt is to be discharged at the expiration of 9 months, ¼ of it is paid immediately, ¼ in 6 months; when ought the balance to be paid?

6. A and B do a work in 12 days, B and C in 18 days, A and C in 30 days; all work together for 5 days and then A leaves; the other two go on for 6 days and then B leaves. In how many days will C finish the work?

7. The population of a country would increase annually 5%, were it not that emigration annually carries off ½% of the people: what will be the increase % in the population after 5 years?

8. I place a straight pole upon the bottom of a pond, so that it emerges perpendicular to the surface of the water, and mark a point 6 inches above the surface; then gently declining the pole (keeping its lower end fixed on the bottom) from its upright position, I find that the mark becomes just submerged at the distance of 40 inches from the pole's first position; find the depth of the water.

9. The two sides of a triangle are 20 and 30 rods respectively, and the base 40 rods: find the length of the line joining the vertex with the middle point of the base.

10. Find the radius of a sphere whose volume is equal to the sum of the volumes of two spheres whose radii are two and three feet respectively.

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No. 21.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

1.—Give reasons for regarding the Article as an Adjective.

2.—Give, as fully as you can, the Syntax of the Possessive Case.

3.—Parse the italicised words in the following sentences:

(*a*) No amount of experience will teach *them wisdom.*

(*b*) Lepidus flatters both,
Of both is flattered; but he neither loves,
Nor *either* cares for him.

(*c*) Villain, knock *me* at this gate,
And rap *me* well.

(*d*) *Whom* he would he slew.

(*e*) Forthwith, on all sides, to his aid *was run*
By angels many and strong.

4.—Correct or justify the following, giving, in each case, your reason:—

(*a*) The great triumphs of modern ingenuity and art are those astronomical clocks and watches, in which the counted vibrations of a pendulum or balance-wheel have detected periodical inequalities even in the motion of the earth itself.—*Arnot.*

(*b*) Language consists not of single words, no more than a ship consists of trees.—*Penny Cyclopædia.*

(*c*) To see distinctly the right way, and to pursue it, are not precisely the same thing.—*Hall.*

(*d*) He that outlives this day and comes safe home.—*Shakspeare.*

5.—Explain the figures Syncope, Paralepsis, Pleonasm, indicating the class to which each belongs; and distinguish Barbarism and Solecism, Simile and Metaphor.

6.—What figures occur in the following:—

(*a*) Death is Sin's eldest daughter.—*Jeremy Taylor.*

(*b*) I die, I faint, I fail.—*Shelley.*

(*c*) Holy and humble men of heart.—*Isaiah.*

(*d*) An upright minister asks, what recommends a man; a corrupt minister, who.—*Colton.*

7.—Give specimens of the Iambus, Trochee, and Amphibrach, and scan the following:

(*a*) Through the depths of Loch Katrine
The steed shall career.

(*b*) Leave the deer, leave the steer,
Leave nets and barges.

(*c*) Why Jove's satellites are less than Jove.

8.—Analyze the following:—

Branches they bore from that enchanted stem,
Laden with flowers and fruit, whereof they gave
To each; but whoso did receive of them
And taste, to him the gushing of the wave,
Far, far away, did seem to mourn and rave
On alien shores; and, if his fellow spake,
His voice was thin, as voices from the grave;
And deep asleep he seemed, yet all awake,
And music in his ears his beating heart did make.
Tennyson.—Lotus eaters.

9.—What is meant by Historical Etymology?

10.—Derive the following—Mechanics; politics; cambric; meander; tantalize; April; Thursday; furlong; fathom; pilgrim; vintage; sarcasm.

11.—Give the Etymological analysis of the following words, mentioning, in each case, prefix or affix, root, literal meaning, and ordinary signification:—Discussion; expressed; adventure; condolence; hypocrite; expedite; atonement; accuracy; cemetery; extravagant; trespass; dilapidation.

12.—Give the historical analysis of the following passage:—

We feel the strength of mind through the beauty of the style; we discern the man in the author, the nation in the man, and the universe at the feet of the nation.

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No. 22.

HISTORY.

TIME—TWO AND A QUARTER HOURS.

1. What led to the Peloponnesian War? Describe the course of events from the peace of Nicias to the close of the war.
2. Give a sketch of the career of Sulla.
3. Name, in order, the Roman Emperors who preceded the first Antonine. Give an account of the Antonines.
4. Narrate the principal events in the reign of Charles IX. of France.
5. Give an outline of the career of Charles XII. of Sweden.
6. Describe what was done, towards the conquest of Britain, by the Romans during the reign of the Emperor Claudius. Did Caligula make any movement to invade Britain? If so, what was the issue? Who built the lines of forts from the Tyne to the Solway Firth, and from the Firth of Forth to the Frith of Clyde? Who built the Picts' Wall, and where was it?
7. Describe the social condition of the English people under the Houses of York and Lancaster.
8. Of the nine English kings who preceded Henry VII., how many died a violent death? State the particulars in reference to the death of each of these.
9. Give an account of the discoveries of Jacques Cartier. When did the French rule in Canada close, and how long had it lasted? Describe the general character of the French Colonial system, contrasting it with the English. Give a sketch of the administration of the Earl of Elgin in Canada.

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No. 23.

BOOK-KEEPING.

TIME—ONE HOUR AND A-HALF.

NOTE.—Answers to questions 1 and 2 should be as carefully written as if they were entries in real account books.

1. Journalize the following transactions :—

1872.			
June	1	Edward Whitby and W. P. Dickson agreed to carry on business in partnership.	
"	"	Borrowed by Edward Whitby of John Whitby, for purposes of business, but on his own responsibility	$1,000·00
"	"	W. P. Dickson paid into bank on account of the firm	620·90
"	2	Paid into bank	1,000·00
"	8	Bought of M. Martilini 13 butts of sherry, @ $112	1,456·00
"	"	Sold John Smith 7 butts of sherry @ $140	980·00
"	"	Paid M. Martilini (by cheque) being $1,456·00 Less discount...... 18·20	1438 80
"	"	Received of John Smith his acceptance at 1 month	980·00
"	10	Paid John Smith's bill into bank at discount. Bill.. $980·00 Amount of discount 4·10	975·90
"	"	Paid duty on 3 butts sherry, for John Smith	373·57
"	"	Paid to our account at bank (by J. Smith, account of duty)	200·00
"	"	Drew cheques on bank— For cash in hand..... $100·00 For petty cash........ 40·00	140·00
"	"	Drew cheque on bank for W. P. Dickson	16·71
"	17	Received of J. Smith balance of amount paid for duty...... .... $173·57 Interest 7 days...... 40	173·97
"	25	Bought of Sandeman & Co., 3 pipes of port @ $180	540·00
"	27	Sold Jas. Simpson 1 pipe port @ $208	208·00
"	"	Sold 4 butts sherry @ $138	512·00
"	31	Wrote off from profits as a percentage to cover bad debts	50·00
"	"	Sundry small expenses paid by clerk during the month	9·40
"	"	Paid salary of clerk for month	50·00

2. Post the above transactions into the Ledger ; no index to the Ledger need be made.

3. Balance and close the Ledger. There are on hand 2 butts sherry and 2 pipes of port, which may be valued at cost price.

4. By how much is the firm solvent or insolvent? What has been the total gain or loss?

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No. 24.

CHEMISTRY AND CHEMICAL PHYSICS.

TIME—TWO AND A HALF HOURS.

1. How is the bulk of a body usually affected by heat? Are there any exceptions to the general rule? If so state such exceptions as are known to you, and describe the circumstances under which the exceptions appear.

2. A polished tea-pot closely covered with flannel is placed beside a similar one uncovered in front of the same fire; which will be most quickly heated? Each of the tea-pots is now filled with boiling water and exposed to the air in a room of low temperature, which will cool soonest? Give a reason for your answer in each case.

3. A straight stick, placed obliquely in water appears bent at the surface; a ray of light, entering the water obliquely, is also bent at the surface; are the stick and the ray bent in the same manner? This answer must be illustrated by a diagram.

4. Describe the experiment whereby Newton demonstrated the composite character of sunlight, and give a brief explanation of the rainbow.

5. You have a series of six Leyden jars, the external coating of the first being connected with the internal coating of the second; the external coating of the second connected with the internal coating of the third, and so on; the external coating of the last jar of the series being connected with the earth; what will be the effect upon every jar of the series when the *first* jar is charged with positive electricity? State the precautions to be observed so that every jar shall be affected by the charging of the first.

6. How would you proceed to construct a Voltaic battery upon Daniell's principle? The great merit of this battery is its constant power. What do you understand by this and to what is it due?

7. What gas most resembles oxygen; how is it prepared, and how is it distinguished from oxygen?

8. Describe the preparation and properties of Nitric Acid.
Nitre is worth $9 per cwt., Chili Saltpetre $4, and Sulphuric Acid, containing 97 per cent. of real acid, $2. Compare the cost of producing Nitric Acid from the two Salts. Equivalents $K = 39{\cdot}1$, $S = 32$, $Na = 23$.

9. Describe the preparation of Chlorine, enumerate its properties, and describe the effects produced by it on the following substances:—Indigo Solution, powdered Antimony, a lighted candle, and dry litmus paper.
A manufacturer of bleaching powder requires 10 tons of Chlorine, how much salt, manganese containing 59 per cent. of the dioxide, and Sulphuric Acid containing 53 per cent. of the real acid, will he need? Eqs. $Cl. = 35.5$, $Mn. = 55$.

10. Describe the common method of making steel, and also, that known as Bessemer's method.

11. Give distinguishing tests for Copper, Mercury, Silver and Gold.

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No. 25.

EDUCATION.

TIME, TWO HOURS.

1. How would you organize a school of 60 children of ages varying from 7 yrs. to 13 yrs., supposing you had one capable assistant? Draw a plan of the school-room you would prefer, showing the arrangement of the classes and the seats and desks.

2. State the principal characteristics of good reading. What are the difficulties encountered in teaching a young child to read? How may these be overcome?

3. Describe fully (illustrating by an example) how you would teach a class *Long Division* so that they might see the reason of every step.

4. In what manner should you propose to teach the elements of grammar? Give reasons.

5. Draw up notes of a lesson on the following subjects for your most advanced pupils:

Botany	Subject	*The Flower*
Natural History	"	*Birds,*
Geography	"	*Climate.*

6. State what you consider the best means of attaining the following objects in school:
   1. Securing attention.
   2. " Order.
   3. Exciting interest in Study.

7. "The study of mathematical science can be of little or no use as an exercise of mind because its *principles* and *processes* of *reasoning* are self-evident." Examine this statement.

8. What are the most important statistics to be recorded in a school.
   1. To aid the teacher in his work,
   2. For the information of the school authorities.

Exhibit tables such as would be suitable for both purposes.

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No. 26.

SCHOOL LAW OF ONTARIO.

TIME—ONE HOUR AND A HALF.

1. Give a summary of the provisions of the Law and decisions of the Superior Courts in regard to the "Personal Liability of Public School Trustees," and mention how that responsibility can be enforced.

2. Mention some of the general powers, liabilities, and disabilities of School Trustee Corporations.

3. In how many ways can Trustees obtain moneys for the support of their School?—distinguishing the sources from which these moneys are obtained.

4. Mention four out of the five purposes or objects for which Trustees cannot lawfully impose an assessment.

5. In making out their Collector's Roll, how must the Trustees be guided in regard to (1) mistakes or omissions in the Township Assessment Roll, (2) inequality in the assessment of Union Sections, (3) an "undivided lot," (4) two or more "owners," and (5) "unpatented land"?

6. In what respect do the provisions of the new law differ from the old, in regard to the formation and alterations of School Section, and Union School Section boundaries?

7. How can Trustees collect School Rates from (1) "non-residents" of their Section, and (2) "unknown owners"?

8. Distinguish between the "lawfulness" and "expediency" of Trustees' School Expenditure.

9. What are the powers and duties respectively of School Auditors, Public School Meetings, and County Inspectors, in deciding between the "lawfulness" and "expediency" of a School expenditure?

10. Mention the cases in which "arbitration" has been abolished and retained in the School Law; and give a summary of the law in regard to arbitrations and awards.

11 What are the provisions of the law and regulations affecting Teachers in regard to (1) Holidays and Vacations, (2) Visiting Schools, (3) Teachers' Meetings, and (4) Discipline in the Schools?

12. Point out fully what are the powers and duties of "Inspectors" under the new law, as distinguished from those of "Local Superintendents" under the old law.

13. Classify the powers and duties of County, Township, and City Councils, in regard to the Public Schools, and shew in what respect they differ, especially in financial matters.

14. Mention the cases in which the law is "permissive" and "obligatory" on Township Councils in providing moneys for School Trustees upon their application.

15. On what grounds can you defend the "compulsory" feature of our system, as a complement to Free Schools; and state how the "compulsory" provisions of the law can be best carried out?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 23rd JULY, 1872.

Rev. GEORGE PAXTON YOUNG, M.A.,
Rev. J. G. D. MACKENZIE, M.A.,
JAMES A. McLELLAN, Esq., M.A.,
} *Examiners.*

No. 27.

NATURAL PHILOSOPHY.

TIME—TWO AND A HALF HOURS.

1. When a body is acted on by a uniformly accelerating force, how is the force measured?

Two particles, P and Q, are moving towards a point A; P, under the influence of a uniformly accelerating force which generates a velocity of 32 feet in a second; Q, under the influence of a uniformly accelerating force which generates a velocity of 40 feet in the second. At a particular instant, when the particles have the same velocity of 20 feet a second, the distance of P from A is 6 feet, and that of Q from A is $6\frac{1}{4}$ feet. Inquire which of the two particles will reach A first.

2. At a point A, which is m feet above the surface of the earth, two bodies pass one another, each with a velocity of 8 feet a second; the one ascending, the other descending. The former returns to the point A at the same instant that the latter reaches the ground. Find the value of m.

3. A straight lever A C B, whose fulcrum is C, is kept at rest by two forces P and Q, the former acting at A in the direction A P, and the latter at B in the direction B Q. The lines P A and Q B produced meet in a point D. Shew that, if the forces P and Q be represented in magnitude by the lines DA and DB respectively, CA is equal to CB.

4. On the same base A B, and on the same side of it, are described the equilateral triangle ABC, and the isosceles triangle ABD, which is right-angled at B. A particle at A is acted on by two forces, one in the direction A C, the other in the direction D A (not A D); and these forces are represented in magnitude by lines which are 2 feet, and $\sqrt{2}$ feet in length respectively. Prove that their resultant is at right angles to A B.

5. A hollow vessel in the form of a right cone is filled with water, and placed with its base horizontal. Is the pressure of the fluid on the base of the vessel different from the pressure on a table supporting the cone (the weight of the containing vessel being left out of account)? If so, explain distinctly the reason of the difference; and state, if you can, the proportion between the pressure on the base of the vessel, and the pressure on the table.

6. Define specific gravity.

A cube floats in water, one-third of it being immersed. By applying a pressure of 1 ℔. it is made to sink to such a depth, that one-half of it is under water. Find the weight of the cube, the specific gravity of water being unity.

7. A hollow sphere, whose radius is 2 feet, is filled with air of an elasticity which would enable it to sustain a column of mercury one inch higher than the barometric column under the existing atmospheric presssure. But if the air in the sphere were enclosed in a cylinder, whose height is $2\frac{1}{3}$ feet, and the radius of its base 2 feet, its elasticity would enable it to sustain a column of mercury $5\frac{3}{7}$ inches higher than the actual barometic column. Find the height of the barometric column.

8. Let a body fall from rest, under the action of gravity, down an inclined plane B A; and let A C be horizontal, and B C vertical. Prove that the velocity, which has acquired at A, is the same as it would have acquired by falling vertically through the space B C.

9. Describe the Common Hydrometer.

When the instrument is made to float in two fluids, let the level of the fluid in the first case be P, and in the second Q. Then, if S_1 and S_2 be the specific gravities of the fluids; V, the volume of the instrument; k, the area of the transverse section of the stem; and d_1 and d_2 the distances of P and Q respectively from the highest point of the stem; prove that

$$\frac{S_1}{S_2} = \frac{V - k\,d_1}{V - k\,d_2}.$$

10. Over a fixed smooth pully a string passes; to one end of which is attached a weight A of 10 lbs., and to the other a weight B of 12 lbs. The weight B descends, drawing up A. In what time (the resistance of the air not being taken into account) will B fall through 8 feet?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 23rd JULY, 1872.

REV. GEORGE PAXTON YOUNG, M. A.,
REV. J. G. D. MACKENZIE, M. A.,
JAMES A. McLELLAN, ESQ., M. A., } *Examiners.*

No. 28.

ENGLISH LITERATURE AND COMPOSITION.

TIME—TWO HOURS AND A QUARTER.

1. Write notes on CÆDMON, LORD BACON, and LOCKE.
2. Give some account of the principal scientific writers of the present century.
3. Give the history of the English Drama; exhibit the structure of Tragedy: and remark on the "three unities."
4. Explain the terms "objective" and "subjective," as applied to poetry.
5. Illustrate Sir Walter Scott's powers as a poet, and write brief descriptions of any of the Waverley Novels that have an historical groundwork.
6. Give the romance of the Holy Grail.

COMPOSITION.

Either of the following subjects may be selected:—

The fortifications of Sebastopol restored.

How much of truth (if any) is there in Burke's assertion, that vice loses half its evil by losing all its grossness?

PROVINCE OF ONTARIO.

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COMMENCING 23rd JULY, 1872.

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} *Examiners.*

No. 29.

NATURAL HISTORY AND PHYSIOLOGY.

TIME—ONE HOUR AND A HALF.

1. How would you distinguish between the flying opossum and the flying squirrel? The dolphin and the porpoise? The dromedary and the camel?

2. What families are comprised under the term Pachydermata? State how you would distinguish between the Indian and the African elephant?

3. What are the leading characters of Ruminants? Describe and illustrate by a diagram, the stomach of a Ruminant.

4. Sketch the skull of a Rodent.

5. State briefly the characteristics of the Carnivora. Into what groups are they divided? Give a characteristic example of each group.

6. Give a full account of the structure of a bird. Name the orders into which birds are divided, and the leading characteristics of each order.

7. How are fishes classified? What is peculiar to their structure?

8. Give a diagram of the human heart, and describe fully the circulation of the blood, stating when and by whom discovered.

9. Describe the parts of the human ear, and the use of each part.

10. A person has received a cut from which the blood is rapidly flowing: how would you determine whether the blood is flowing from an artery or a vein, and how would you proceed to stop it in each case?

PROVINCE OF ONTARIO.

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} *Examiners.*

No. 30.

ALGEBRA.

TIME—TWO HOURS AND A HALF.

1. It is between 3 and 4 o'clock, and the minute hand is 15 minutes' space ahead of the hour hand. Find the time,

2. Prove that if x and y be the arithmetical and harmonical means between any two quantities, xy is the geometrical mean between the squares of these quantities.

3. The sum of the cubes of the roots of the equation $x^2 - x - p = 0$ is 19. Find p.

4. Given $\left(\frac{10x+2\sqrt{2}}{5x-2\sqrt{2}}\right)^2 = 22 - 12\sqrt{2}$, find x in the form : $m+n\sqrt{r}$, where m, n, and r are rational.

5. Solve the equation $x^2 + \frac{1}{x^2} + x + \frac{1}{x} = \frac{27}{4}$.

6. Solve the simultaneous equations :

$$x^2 + y^2 + xy = \tfrac{1}{4},$$
$$4x^2 + 8y^2 + 11xy = \tfrac{1}{4}.$$

7. Solve the simultaneous equations ;

$$\frac{1}{4x^2 - y^2} + \frac{1}{2x + y} = \frac{1}{3}$$
$$2x - y - 2(4x^2 - y^2) + 3 = 0.$$

8. Prove that if from any number the sum of its digits be subtracted the remainder is divisible by the radix of the scale (whatever the scale be) decreased by unity.

9. Let the Binomial Theorem for the expansion of $(a+b)^n$, when n is a positive integer, be assumed to have been proved for all values of n up to a certain number, say N. Prove, then, that the law holds when n is taken equal to N + 1, and deduce the conclusion that the law holds when n is any whole positive number whatever.

10. The town P is situated between M and N, its distance from M being $\frac{2}{3}$ of its distance from N. A traveller, A, leaves N for M at the same time that another, B, who goes one mile per hour slower than A, and who is travelling towards N, is at a point between M and P, 6 miles distant from P. On reaching P, B waits the arrival of A; they spend some time together, and then continue their journeys, A towards M and B towards N. The former reaches M five hours before the latter arrives at N. Had B only delayed for half an hour at P they would have met half way between M and N. Find the distance between M and N.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

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} *Examiners.*

No. 31.

GEOGRAPHY.

TIME—TWO HOURS.

I. (1) Define NODES, COLORES, PARALLAX, PRECESSION of the EQUINOXES.
(2) From what premises do we infer the diurnal motion of the earth?
(3) The length of the natural day is 24 hours, though the earth performs a complete revolution on its axis in 23 h. 56 m. 4 sec. Explain.
(4) Explain the term "oblate spheroid," and show how it has been ascertained that this is the exact form of the earth, (firstly) from observations made with pendulum clocks; (secondly) from different admeasurements of a degree on the same meridian.

II. Account for the *tides* and *trade winds.*

III. (1) The longitude of Kurachee (India) is 67° 17′ E.; that of Lisbon, 9° 8′ 30″ W. When it is 2 P.M. at Kurachee, what o'clock is it at Lisbon?
(2) In an observation taken in the Southern Hemisphere on the 10th of August, the sun's meridian altitude was found to be 58°, declination for the day being 16° 5′, chronometer time 12.23 P.M. Ascertain the latitude and longitude.

IV. Give a full account of any one of the following countries:—Mexico, Japan, New Zealand.

V. Explain the terms Landgrave, Storthing, Grand Llama, Maharajah, Monsoon, Pampas.

VI. Mention historical associations connected with the following places, giving dates where you can:—Aboukir, Nantes, Pau, Worcester, Iona, Lucerne, Silistria, Trebizond, Khyber Pass.

VII. Arrange the West India Islands in groups, and mention twelve of those which are owned by European powers.

VIII. (1) Trace the rivers Saguenay, St. Maurice, and Richelieu, and give a description of the "Eastern Townships."
(2) Draw a map of the Western peninsula of Ontario, indicating, as nearly as you can, the position of counties, or portions of counties, included in it.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

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} *Examiners.*

No. 32.

BOTANY AND AGRICULTURE.

TIME—ONE HOUR AND A HALF.

1. Give an outline of the classification of the vegetable kingdom according to the natural method, proceeding only to the classes and great sections.

2. Give illustrations of each of the following terms: Runner, sucker, stolon, corymb, irregular flower, compound pistil, compound leaf.

3. How would you distinguish between a root and a stem?

4. Explain clearly the technical terms in the following description of the maple sub-family; Flowers generally polygamous or diœcious, regular. Petals, often none, but calyx sometimes petal-like. Stamens, 4 to 12. Styles, 2, united below. Fruit, a pair of keys, united at the bottom. Leaves opposite.

5. Name the families to which the following belong, giving the distinguishing characteristic of each: Turnip, radish, pea, apple.

6. State the advantages of draining. In heavy soils what is the proper depth for drains, and how far should they be apart?

7. What is gypsum? On what kind of crops does it produce the greatest effect? Give reasons.

8. What are the defects of (1) heavy soils, (2) sandy soils? State how these defects may be remedied.

9. Name the best soils for the following crops: Wheat, barley, oats.

10. Give a rotation of crops suitable for heavy soils.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 23rd JULY, 1872.

REV. GEORGE PAXTON YOUNG, M.A.,
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Examiners.

No. 33.

EUCLID.

TIME—TWO AND A HALF HOURS.

1. If a straight line touch a circle, and from the point of contact a straight line be drawn cutting the circle, the angles which this line makes with the line touching the circle shall be equal to the angles which are in the alternate segments of the circle.

2. To inscribe a circle in a given triangle.

3. Equal triangles which have one angle of the one equal to one angle of the other, have their sides about the equal angles reciprocally proportional.

4. Similar triangles are to one another in the duplicate ratio of their homologous sides.

5. In any right angled triangle, any rectilineal figure described on the side subtending the right angle is equal to the similar and similarly described figures on the sides containing the right angle.

6. Two circles cut each other, and through the points of section are drawn two parallel lines, terminated by the circumferences. Prove that these lines are equal.

7. Let A C and B D, the diagonals of a quadrilateral figure A B C D, intersect in E. Then, if A B be parallel to C D, the circles described about the triangles A B E and C D E shall touch one another.

8. Divide a triangle into two equal parts by a straight line at right angles to one of the sides.

PROVINCE OF ONTARIO.

EXAMINATION OF SECOND PROVINCIAL AND FIRST CLASS COUNTY CERTIFICATES OF QUALIFICATION AS PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION

COMMENCING 16th JULY, 1872.

ANSWERS TO QUESTIONS.

ALGEBRA—Second Class.

1.—$7y^2 - 8x$.

2.—Book-work.

3.—$x^2 + 2$.

4.— 3.

5.— m.

6.—$y = \dfrac{mc - ar.}{mb - an.}$

When $mc - ar$ and $mb - an$ are both zero, the one of the given equations is involved in the other, and the question is indeterminate.

7.—$x = 2$.

$y = -2$.

8.—Book-work.

9.—34.

10.—24.

NATURAL PHILOSOPHY—Second Class.

1.—Book-work.

2.—$\dfrac{1000}{\sqrt{21}}$ lbs.

3.—Book-work.

4.—80 lbs.

5.—Book-work.

6.—9ft., 12ft., 15ft.

7.—Book-work (Sangster, p. 48).

8.—3000 oz. It would be different, because the depth of the centre of gravity, below the highest point of the inclosed fluid, would be different.

9.—The syphon will cease to run when the air becomes so rarified as to be no longer able to sustain a column of water of the altitude of the highest part of the syphon above the surface of the fluid in the bowl.

10.—3 inches.

ARITHMETIC—Third Class.

1.—$11\frac{1}{9}$.

2.—$\frac{9}{11}$.

3.—\$293·12$\frac{7}{16}$.

4.—1875, 2475, 3150, 300.

5.—\$332·03$\frac{1}{8}$.

6.—\$17·02$\frac{1}{8}$.

7.—$6\frac{12}{25}$.

8.—150.

9.—16.68$\frac{4}{7}$

10.—$231\frac{13}{27}$.

ARITHMETIC—Second Class.

1.—Book-work.

2.—$10\frac{8}{89}$.

3.—\$900.

4.—\$1250.

5.—$\frac{107}{208}$.

6.—72 at 30, 48 at 45, and 24 at 60.

7.—5141

8.—\$31·08.

9.—\$6·01$\frac{2}{3}$.

10.—150.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES, JULY 1872.

Values assigned by the Central Committee of Examiners.

See General Regulations respecting the Examination of Candidates, &c., Nos. 7 and 8.

		1	2	3	4	5	6	7	8	9	10	Total
[illegible] NATURAL PHILOSOPHY	Number of Marks for correct answers	17	17	17	1[illegible]	1[illegible]	18	18	16	18	18	[illegible]

	Questions	1	2	3	4	5	6	7	8	Total Value of First Seven Questions
[illegible] EUCLID	Number of Marks for correct answers	20	20	[illegible]	20	20	25	25	25	175

	Questions	1	2	3	4	5	6	7	8	9	10	Total
[illegible] ALGEBRA	Number of Marks for correct answers	16	1[illegible]	16	[illegible]	18	18	18	18	18	20	17[illegible]

[illegible] ARITHMETIC. (Second Class.) Total value of the paper 200, each question of the same value.

(Third Class.) Total value of the paper 200, each question of the same value.

[illegible] CHEMISTRY. Value of each question 10, total value of the paper, 100.

[illegible] BOTANY AND PHYSIOLOGY. Total value of the paper, 100, each question of same value.

[illegible] BOOK KEEPING. Total value of the paper 102, each question of same value.

[illegible] [illegible] AGRICULTURE. Total value of the paper, 150, each question of same value.

EDUCATION. (Second Class.) Total value of the paper, 152, each question of same value.

[illegible] SCHOOL LAW. (Second Class.) Total value of the paper 75, each question of same value.

[illegible] EDUCATION & SCHOOL LAW. (Third Class.) Total value of the paper, 152, each question of same value.

	Questions		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
[illegible] ENGLISH GRAMMAR	Number of Marks for perfect answers	(Second Class.)	[illegible]	[illegible]	10	[illegible]	12	[illegible]	[illegible]	15	18	15	[illegible]	12	12	12	1[illegible]
		(Third Class.)	12	20	10	10	12	10	8	25	18	1[illegible]	15				

	Questions		1	2	3	4	5	6	7	8	9	10	11	12	Total
[illegible] GEOGRAPHY	Number of Marks for perfect answers	(Third Class.)	21	20	1[illegible]	1[illegible]	20	13	[illegible]	16					1[illegible]
		(Second Class.)	14	13	10	12	15	10	1[illegible]		10	12	1[illegible]	10	1[illegible]

[illegible] HISTORY. Number of Marks for perfect answers. (Second Class.) Value of each question to be answered by Candidates for a Second Class Certificate, [illegible]. Total value of the paper 1[illegible].

(Third Class.) Value of each question to be answered by Candidates for a Third Class Certificate, [illegible]. Total value of the paper 150.

	Questions		1	2	3	4	5	6	7	Total
[illegible] ETYMOLOGY	Number of Marks for perfect answers	(Second Class.)	12	20	10	12	1[illegible]	1[illegible]	14	100
		(Third Class.)	12	20	10	12				54

[illegible] READING & DICTATION. A perfectly satisfactory exercise to be reckoned 150.

	Questions	1	2	3	4	5	6	Total
[illegible] DOMESTIC ECONOMY	Number of Marks for correct answers	17	15	1[illegible]	12	[illegible]	9	75

NOTE.—The general standing of a candidate to be determined irrespectively of his proficiency in Music and Drawing, but candidates who pass [illegible] examination in these [illegible] shall receive certificates to that effect. The [illegible] [illegible] the Board of Examiners authority to obtain the services of special examiners in Vocal Music and Linear Drawing in case members of the Board are not familiar with these subjects.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

No. 1.

ZOOLOGY, BOTANY, AND AGRICULTURE.

(SPECIAL PAPER.)

TIME.—TWO HOURS AND A HALF.

1. Describe the nature of the Carnivora, and the groups into which they are divided.
2. Name and distinguish the orders of Reptilia.
3. Describe the Annelida, and the Myriapoda.
4. Give the precise meaning of Amphibious; describe the transformations of a frog in respect to the organs of locomotion and of respiration.
5. "Plants consist of two kinds of organs." Name and describe these organs.
6. Describe how the Seedling is nourished at the beginning of growth.
7. "The Root exhibits some striking variations." Describe some of these variations.
8. Describe the different means by which plants are propagated.
9. To what kinds of Soil may lime be advantageously applied? State its beneficial effects.
10. On what principle is founded the theory of the Rotation of Crops? Enumerate the advantages arising from a judicious rotation.
11. Shew how the defects of heavy clay soils may be remedied. How should sandy soils be treated?
12. State the advantages of draining. State, with reasons, what soils are improved by draining.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

No. 2.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

1. In what words is the aspirate rightly dropped when it stands as their first letter?
2. State the various uses of the pronoun "it."
3. Show that the Present Perfect is a present tense, and write sentences to exhibit the violation of the "sequence of tenses" in connexion with that tense
4. Explain "Conjunctive Adverb," and write sentences containing the various forms of the Adverbial Phrase.
5. In each of the following pairs of sentences point out the difference in meaning:—
    - (*a*) He was the first *that* came. He was the first *who* came.
    - (*b*) He would make a better statesman than lawyer. He would make a better statesman than *a* lawyer.
    - (*c*) He arrived *safe*. He arrived *safely*.
6. Explain the construction of the objective case in each of the following:—"He waited all night." "The book is worth a shilling." "Full many a league they rode." "They dreamt the future fight."
7. Examine the correctness of the following, giving, in each case, your reason for retaining or altering the construction:—
    - (*a*) "We are still at a loss who civil power belongs to."—*Locke*.
    - (*b*) Thou, Nature, partial Nature, I arraign.—*Burns*.
    - (*c*) There are a sort of spirits fall but once, but that once is perdition.—*Smith's Dramas*.

"In our halls are hung
Armoury of the invincible knights of old."—*Wordsworth*.

8. Analyze the following:—

Nor second he, that rode sublime
  Upon the seraph-wings of Ecstasy,
  The secrets of th' abyss to spy,
He pass'd the flaming bounds of place and time:
The living throne, the sapphire-blaze,
Where angels tremble while they gaze,
He saw; but, blasted with excess of light,
Closed his eyes in endless night.

GRAY.—*Progress of Poesy*.

9. Give the different powers of the prefixes *be* and *en* or *em*.
10. Give adjectives of classic origin corresponding with the following nouns:—Ship, fish, tooth, glass, hand, rule, disease, marriage, art, forest.
11. Trace the following to Latin roots:—Autumn, biscuit, linen, fanatic, infant, verdict, federal, carnival, farrier, fossil.
12. Give words—two in each case—derived from these Greek roots:—Charis, cratos, metron, phone, pathos.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

No. 3.

ENGLISH GRAMMAR, ETYMOLOGY, AND SPELLING.

TIME—THREE HOURS.

1. Name and define those Parts of Speech which are inflected.
2. Point out the Vowels in the words,—Awful, Wayward, Yesterday; give the feminine forms of Earl, Hero, Executor; the plurals of Penny, Chimney, Staff, Tyro, Ellipsis, Soliloquy; the comparatives and superlatives of Much, Late, Fore; the past tense and past participle of Eat, Flow, Burst, Mean, Demean.
3. Give the rules for forming the Degrees of Comparison of adjectives.
4. Distinguish between Transitive and Intransitive Verbs, and give an example of each.
5. Inflect the Indicative Present of the verb "To Strike," in its three forms.
6. What is a Sentence? Write specimens of the Simple, the Compound, and the Complex Sentence.
7. Quote the Rules of Syntax which the following sentences are severally intended to exemplify:

    (a) That cup was deemed a *cure* for every ill.

    (b) The great Emathian conqueror bid *spare* the house of Pindarus.

    (c) Neither of those generals *understands* the art of war.
8. Change the construction of the following sentence so that it shall contain a Nominative Absolute, and parse the latter half:

    "Having completed his arrangements for the battle, Napoleon beheld the vast array defile before him."
9. Define the terms "Subject" and "Predicate," and analyze the following: —

    "The massive grandeur of his features is in accordance with the dignified repose of the action, and over all there is the lofty look of the prophet not unaccustomed to hold intercourse with his God."
10. Correct, where necessary, the spelling of the following words:—Myrmidon, verdigrease, poignancy, surfiet, metaphore, psycology, laudible, plausible, inveagle, ichthology, anemometre. neophyte.
11. Mention prefixes, each in combination with some word, which denote rest and motion in time and place.
12. Give words in which the following affixes appear, and state the force of each affix:—"ory," "ship," "ism," "ule," "ose," "ish."

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

No. 4.

ARITHMETIC.

TIME—THREE HOURS.

1. Find the length of the longest chain that will exactly measure both the distances 177 yds. 1 ft. 10 in., and 239 yds 1 ft. 2 in.
2. The true year is exactly 365 da. 5 h. 48 min. 49·7 sec., and the common year 365 da ; show that the following rule for leap year will render the calendar correct to within one day, for a period of 4000 years :—(1.) Every year that is exactly divisible by 4 is a leap year the centennial years excepted; the other years are common years. (2.) Every centennial year that is exactly divisible by 400 is a leap year ; the other centennial years are common years.
3. A & B engage in trade ; A invests $6000 and at the end of 5 months withdraws a certain sum. B puts into the the business $4000 and at the end of 7 months $6000 more: at the end of the year A's gain is $5800 and B's is $7,800. Find the amount that A withdrew.
4. A pound (Troy) of standard gold (22 carats fine) is coined into 45 guineas; if the value of the alloy be $\frac{11}{239}$ that of an equal weight of pure gold, find the value of the alloy per pound avoirdupois.
5. Find the square root of 5 to 10 places of decimals, and deduce the values of $\sqrt{\frac{1}{5}}$, $\frac{\sqrt{5}+1}{\sqrt{5}-1}$, $\sqrt{0\cdot5\dot{5}}$
6. A sold to B a lot of tea which cost him $1,200, B sold it to C who disposed of it for $1,597·20: if each of the three merchants gained the same rate per cent find the prices at which A and B sold the tea.
7. When exchange at New York on Paris is 5 francs 16 centimes per $1, and at Paris on Hamburg $2\frac{1}{8}$ francs per marc banco, what will be the arbitrated price in New Yorkof 11520 marc bancos of Hamburg ?
8. If the specific gravity of coal be 1·250, how many tons of coal (28 lbs to the quarter) in a square mile of coal seam whose average thickness is 80 feet ?
9. A grocer mixes 70 lbs of tea with 40 lbs of a better quality, and finds that the mixture is worth $62\frac{3}{11}$ cents per lb, the difference in the prices being 20 cents, find the price of each kind.
10. A grain dealer expended a certain sum of money in the purchase of wheat, half as much again in the purchase of barley, and twice as much in the purchase of oats: he sold the wheat at a profit of 5%, the barley at a profit of 8%, and the oats at a profit of 10%, receiving altogether $9,740. Find the sum laid out in each kind of grain.
11. The sides of a rectangular field containing 27 A. 1 R. 8 P., are as 21 to 13: find the perimeter of the field.
12. Two adjacent sides of a parallelogram are 30 yards and 40 yards respectively : one of the diagonals is 50 yards ; find the other.

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3rd CLASS COUNTY CERTIFICATES.

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No. 5.

ARITHMETIC.

TIME.—THREE HOURS.

1. Simplify $\dfrac{\frac{5}{32}+\frac{7}{24} \text{ of } 3\frac{1}{4}-\left(\frac{7}{16} \text{ of } \frac{37}{21}-\frac{1}{6}\right)}{\frac{5}{28}-\frac{3}{14} \text{ of } \frac{1}{2}}$

2. Bought 1944 feet of boards at \$$20\frac{1}{4}$ per M, 3150 feet of Scantling at \$2·$87\frac{1}{2}$ per C, and 17512 of Siding at \$7·50 per M ; what did the whole cost me ?

3. 40 lbs. of Standard gold, (*i.e.* 22 carats fine) are coined into 1869 Sovereigns ; find the weight of pure gold in a Sovereign.

4. Bought 640 bushels of barley at the rate of 32 bushels for \$20·08, and sold it at the rate of 10 bushels for \$$8\frac{3}{4}$; find my profit on the transaction.

5. A does $\frac{3}{5}$ of a work in 11 days ; B then comes to his assistance and, together, they finish it in 4 days ; how long would it take each by himself to do the work ?

6. B offers C a horse for a certain price and A offers him one for one third less ; B then reduces his price $\frac{3}{10}$, and A reduces his price $\frac{1}{5}$, at which prices C buys both horses for \$296 ; find each man's asking price.

7. Define Ratio and Proportion. Shew how to state and solve a question in simple proportion, giving fully the reasons for the different steps.

8. An Agent receives 10 shillings commission for every £9 19s. $11\frac{3}{4}$. collected ; he receives altogether £9 19s. $11\frac{3}{4}$. ; find the amount collected.

9. A speculator bought stock when it was 18% below par, and sold it when it was 10% below par, find his rate of gain.

10. If 4·35 lbs of bread can be bought for 20 cents when wheat is \$1·15 per bushel ; what weight of bread can be purchased for \$3·45 when wheat is \$1·80 per bushel.

11. Find the cost of papering a room 12 ft. 4 in. high, 16 ft. long, and 14 ft. 3 in. wide, the paper being 2 ft. 6 in. wide, and costing 60 cents a yard.

12. The profits of a garden for two years were \$1456 ; the profits of the second year being 8% more than those of the first : find the profits for each year.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

No. 6.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS AND A-HALF.

1. State what mental, moral, and physical qualifications you regard as essential to the successful teacher.
2. Give notes of a lesson introductory to simple proportion.
3. "The theory that Education is simply the development of the intellect through the acquisition of knowledge is thoroughly false." Discuss this statement.
4. Define School Government, and specify some of the principal hindrances in the way of securing it.
5. School arrangement (embracing all that relates to the sessions, recesses, studies, recitations, and exercises of the School), must be *simple*, *definite*, *systematic*, and *practical*.

   Explain and discuss the importance of these characteristics.
6. Three species of record of standing may be adopted for the purposes of discipline, the *Pure Merit*, the *Mixed Form*, and the *Pure Demerit*. Discuss their values.
7. Give notes of lessons on, (1) the spheroidal form of the earth ; (2) the human eye ; (3) chemical affinity (4) the maple leaf.
8. Describe a School-house suitable for the accommodation of 60 pupils, as to (1) size, &c. ; (2) School Furniture ; (3) School Apparatus, (4) external arrangements.
9. Explain the law in regard to making or neglecting to make the declaration of office on the part of a school trustee. How does the omission legally affect the acts of the trustee ?
10. What are the general powers of a single auditor of school section accounts, or of the two auditors together. Distinguish between the powers (1) of the trustees, (2) of the public meeting, and (3) of the Inspector, in regard to their accounts.
11. Discuss briefly the Township Board System and the present isolated School Section System, in regard (1) to the number of schools required, (2) the salaries of teachers, and (3) the convenience to the ratepayers of being able to send their children to any school in the township.
12. Give a summary of the Regulations in regard (1) to presents to teachers, (2) collections and subscriptions in a school for any purpose, (3) notice of shows and exhibitions, (4) a teacher providing books and stationery, or acting as agent for books, (5)or giving prizes or rewards to pupils on his own behalf.

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3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

No. 7.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS AND A HALF.

1. What is Education?
2. Shew clearly how Education differs from Instruction.
3. Distinguish between the *rote system* and the *intellectual* system of teaching.
4. Shew that the Teacher who is the slave of text-books cannot *educate*.
5. "In commencing an elementary course in geography, I would first give an object lesson on *form*." Illustrate this plan.
6. "The Multiplier *must* be abstract." Shew how you would prove the truth of this proposition, even in the case of examples which seem to contradict it, *e. g.*, six boys received $5 each, how much did all receive? Find the area of a door seven feet long and four feet wide.
7. Exemplify the manner in which you would endeavour to give your pupils a clear idea of a fraction, and of the truth that both terms may be multiplied by the same number without changing the value of the fraction.
8. Describe the Word-Method and the Phonic-Method of teaching reading to beginners.
9. Discuss the influence of the Teacher's own character upon the pupils of his school.
10. Point out what are the requirements of the Statutes in regard to Quarterly School Examinations by the Teacher and distinguish between his powers and those of the Trustees (if any) in regard to these examinations.
11. What is the limit of the Teacher's power in regard (1) to suspension of Pupils and (2) in regard to their expulsion.

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No. 8.

READING AND DICTATION.

(This Paper is not to be seen by the Candidates.)

As an exercise in Reading, the following selections from the Fifth Book may be used for all the candidates : —

Prose.—Locksley, page 363. "The diminished list of competitors—displeasure."

Poetry.—Edinburgh after Flodden, page 152. From the beginning to, "And the asker's voice is dumb."

For Dictation the following may be taken :—Fifth Book, page 353, "There is a separate science—human family."

(The penmanship in this paper will be taken into account.)

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2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

Commencing 26th December, 1872.

No. 9.

HISTORY.

TIME—TWO HOURS AND A-HALF.

Candidates for Third Class Certificates will confine themselves to the first ten questions of this paper.

Candidates for Second Class Certificates will omit questions 1, 2, 3, 4, and 9.

1. Give a sketch of the reign of Edward II. of England.
2. Under what circumstances did the first of the Tudors come to the throne?
3. What was the Act of Uniformity, passed in the reign of Charles II., and to what did the passing of the Act immediately lead?
4. Describe the circumstances under which the seven Bishops were committed to the Tower in the reign of James II. Give an account of their trial, and its result.
5. When did the Treaty of Union pass the Scottish Parliament? Mention some of its principal articles.
6. Describe the circumstances which led to the American War of Independence; and write brief notes of the War, connected with the following places:—Lexington, Saratoga, Yorktown.
7. After the death of Alexander the Great, what division of his empire was made?
8. Write brief historical notices of Cambyses, Themistocles, and Epaminondas.
9. Notice briefly important historical occurrences connected with the names, Cannæ, Pharsalia, Actium.
10. Give a sketch of the first settlement of Canada.
11. Describe the first capture of Quebec. How did Quebec come again into the possession of the French?
12. Describe the state of public affairs in England during the eleven years from 1629 to 1640.
13. Give an account of what was done at the Convention called in 1688 by William of Orange.
14. What led to the war of the Spanish Succession? Mention the principal victories obtained by Marlborough in the course of the war. By what treaty was the war closed? and what were the chief terms in the Treaty directly affecting Great Britain?
15. Give a brief account of Gustavus Vasa, of Sweden, and as full an account as time permits of the career of Gustavus Adolphus.

NOTE.—In estimating the value of the answers to the above questions, the Examiners will take into account the style of the composition, as well as the historical knowledge displayed.

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COMMENCING 16th DECEMBER, 1872.

No. 10.

GEOGRAPHY.

TIME—TWO HOURS.

1. Define Tropics ; Horizon (sensible and rational) ; Zodiac ; Oasis ; Delta ; giving examples of the last two.
2. State the province of Mathematical Geography. Distinguish between Great and Small Circles, giving examples of each, as conceived to be drawn upon the Globe.
3. What is meant by the *plane* of the Earth's orbit ? What is the position of the Earth's axis with reference to this plane ?
4. Classify the political divisions of Europe, giving the number of each ; give a list of the First and Second-class Powers, with their capitals ; and state the physical features of the south coast.
5. What countries does the Chinese Empire embrace ? Mention Foreign Possessions in China. Name the Mountain Chains of Asia, and give their situation.
6. Give, as fully as you can, a description of any one of these three :—Australia, Hindostan, British Columbia.
7. State accurately the position of the following :—Bremen, Worms, Presburg, Palembang, Nangasaki, Benares, Pondicherry, Tasmania, Formosa, Lake Victoria Nyanza, Lake Baikal, Cape Comorin, Cape Guardafui, St. of Malacca, Gulf of Tonquin, Gulf of Carpentaria.
8. What city on the Arno ? On the Spree ? What towns in the Douro Basin ? What country S. of Zanguebar ? What large river empties into the Gulf of Guinea ? What into the Persian Gulf ? What bay E. of Maine ? What river between Maine and New Brunswick, flowing into that bay ? What city on Patapsco River ? What strait between Nova Scotia and Cape Breton ? What Bay N. of Counties of Grey and Simcoe ? What river rises in Lake Oskelanaio ?
9. By whom were the following States respectively settled ? New York ; Delaware ; South Carolina ; Louisiana; Maryland.
10. Give an account of the political institutions of the Dominion of Canada.
11. Name the counties, or portions of counties, (with county towns) included in the Western Peninsula of Ontario.
12. Draw a map of South America.

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No. 11.

GEOGRAPHY.

TIME.—TWO HOURS.

1. Define EQUATOR, ECLIPTIC, ISTHMUS, PENINSULA, ARCHIPELAGO.
2. Name the Islands between Europe and America, N. of the parallel of 30°; the New England States, with their capitals; and the countries of South America on the Atlantic Coast.
3. Give the boundaries and chief physical features of Scotland.
4. Name the Mountain-chains of Europe, and give ther situation.
5. Name the principal Volcanoes in Europe and America, and give their situation.
6. Name the principal rivers of North America that flow into Hudson Bay, the Arctic Ocean, and the Pacific Ocean; and those of Europe that flow into the Black Sea.
7. Into what bodies of water do the following rivers discharge themselves?—St. Lawrence, Mississippi, Orinoco, Ural, Don, Guadalquivir, Loire, Seine, Vistula, Severn.
8. State accurately the position of the following:—Madrid, Berne, Christiania, Cordova, Bristol, Canterbury, Odessa, Tallahassee, San Francisco, Cracow, Isle of Man, Malta, Straits of Messina, Little Belt, Gulf of Danzig, Gulf of Taranto.
9. What groups of islands N. of Scotland? What two countries S. W. of Russia? What Strait connects the Adriatic Sea with the Mediterranean? On what Island is Copenhagen? What rivers of France flow into the Bay of Biscay? What range of mountains between the Black Sea and the Caspian? What two Sounds E. of North Carolina? What Capes at the entrance of Delaware Bay? What river between S. Carolina and Georgia? What group of islands between Prince Edward Island and Newfoundland?
10. Trace the course of the Ottawa, naming its tributaries and bordering counties on the Ontario side.

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No. 12.

PRINCIPLES OF VOCAL MUSIC AND LINEAR DRAWING.

TIME—ONE HOUR AND A HALF.

No. Value.

1. V. What is the number of natural sounds attainable by the human voice?
2. X. How may the teacher represent to a class the treble stave and the bass stave?
3. X. Explain the terms "pianissimo," "decrescendo," "mezzoforte," "sforzato," "accel° a poco a poco."
4. X. Describe a *pause*. What is the use of it?
5. XV. What tones or semitones does the "perfect fourth" contain? What the "pluperfect fourth?"
6. XXV. How is the relative minor to any given major scale formed? Why is such a scale said to be relative? Why minor?

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1. V. What directions or cautions may be given to pupils before they commence to copy a drawing?
2. X. Draw the front view of a church with tower, indicating each step of the process.
3. X. Are arches always semicircles? How are they sometimes otherwise formed? Show this by giving a drawing of a Gothic window.
4. XXX. Exhibit the method given in the text-book for constructing a regular pentagon, one of the sides being given.
5. XX. Design a simple pattern to fill a regular hexagon.

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No. 13.

EUCLID.

TIME—TWO HOURS AND A HALF.

1. If one side of a triangle be produced, the exterior angle shall be greater than either of the interior opposite angles.

2. Enunciate the 32nd Proposition of Book 1.; and, assuming the proposition, deduce the following Corollaries:

   Cor. 1. All the interior angles of any rectilineal figure, together with four right angles, are equal to, &c.

   Cor. 2. All the exterior angles of any rectilineal figure are together equal to, &c.

3. To describe a square on a given straight line.

4. To describe a square that shall be equal to a given rectilineal figure.

5. If a straight line be bisected, and produced to any point, the rectangle contained by the whole line thus produced, and the part of it produced, together with the square on half the line bisected is equal to, &c. (6. II. E.)

6. ABC and DEF are two triangles, having the two sides BA, AC, equal to the two ED, DF, each to each, and the angle ABC equal to the angle DEF. Prove that the angles ACB and DFE are either equal to one another, or are together equal to two right angles.

7. ACB is an equilateral triangle; D, the middle point of AB. Let FCD be an equilateral triangle described on CD; the side DF cutting CB in G. Join BF. Prove that BF=BD.

8. Let DABE be a straight line; CAB, an isosceles triangle (equal sides, CA, CB) described on the base AB; and FDE an isosceles triangle (equal sides, FD, FE) described on the base DE, and on the other side of the line DE from the triangle CAB. Join CD, CE, FA, FB. Then, if the angle DFE be equal to the angle ACB, the triangle CDE shall be equal to the triangle FAB.

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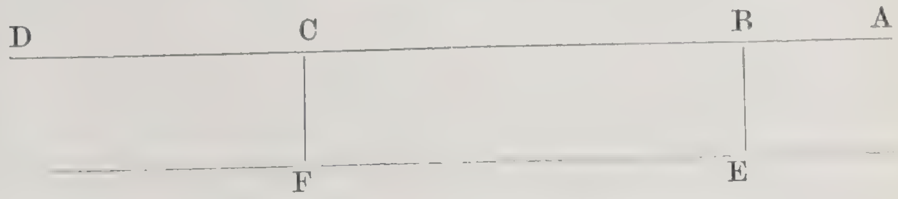
No. 14.

NATURAL PHILOSOPHY.

TIME—TWO HOURS AND A-HALF.

1. Draw a system of pullies (three moveable pullies in the system) in which each pully hangs by a separate string; and state (without proof) what the Power must be in such a system to sustain a weight of 800 lbs.
2. Describe the Air-pump.
3. Enunciate Boyle's Law.
4. Under the partially exhausted receiver of an air-pump, the pressure of the rarified air on a sphere, whose radius is 1 foot, is 8640 lbs. Taking the pressure of the free external air as 15 lbs. on the square inch, prove that the elasticity of the air under the receiver is less than that of the external air in the proportion of the diameter of a circle to its circumference.
5. Draw a diagram representing the essential parts of Bramah's press; and describe the instrument, explaining distinctly the Hydrostatical principle on which its action depends.
6. Enunciate the principle of the Parallelogram of Forces.
7. A particle at E, the centre of a square ABCD, is acted on by two forces, represented in magnitude and direction by the lines EA and EF respectively, F being the middle point of CD. Prove that the resultant of these forces is in a direction perpendicular to AD. If the side of the square be 2 feet in length, what is the magnitude of the line representing the resultant?
8. ABC is a lever, with B as fulcrum. The arms BA and BC are straight, but inclined to one another in such a manner that the perpendicular let fall from C on AB produced is 5 feet; BC being 13 feet; and AB 12 feet. When AB is horizontal, the lever is kept at rest by a weight of 20 lbs., acting vertically at A; a weight of 10 lbs. acting vertically at C; and a weight W acting vertically at D, the middle point of BC. Find W.
9. A uniform heavy beam ABCD, whose length is 24 feet, is supported horizontally on two props, EB and FC; BA, the distance to which it extends beyond the prop BE, being 4 feet; and CD, the distance to which it extends beyond the prop CF, being 8 feet. Show that the pressure on one of the props is double that on the other.



10. A hollow cube, whose capacity is one cubic foot, is filled with a liquid whose specific gravity is 1·025, and is held in such a position that its most elevated point is 6·24 inches vertically above its centre. The specific gravity of water being unity, and the weight of a cubic foot of water 1000 oz., find the pressure on the interior surface of the cube.

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No. 15.

BOOK-KEEPING.

TIME.—ONE HOUR AND TWENTY-MINUTES.

1. Describe the following books: Day Book, Ledger, Bill Book, Invoice Book.

2. How are the following accounts balanced: Merchandise, Interest, Private Account?

3. State, with reasons, which side in the following accounts can exceed the other: Cash, Bills Receivable, Bills Payable.

4. What is the difference between a Trial Balance and a Balance Sheet?

5. What errors may occur in posting which the Trial Balance will not discover?

6. In a Merchant's books, I find that the Dr. side of Stock acct. is $600, and the Cr. side $7250, being his assets and liabilities on commencing business; the Dr. side of Private Account is $145, the Dr. side of Loss and Gain Acct. is $129 and the Cr. side $640; What is the net loss or gain, and the amount of the former and of the present net capital?

7. Give Day Book entries which would be journalized as follows:—
   (1) Merchandise Dr.
   To Bank of Toronto, $100.
   (2) Bills Payable Dr. to Sundries.
   Interest $10.
   Cash $400.
   (3) Merchandise Dr. to Sundries.
   Cash $200.
   Bank of Toronto, $200.
   J. Smith & Co, $400

8. Journalize the following Day Book entries:—
   (1) Received from A. B. Montreal, a quantity of Dry goods, invoiced at $1850.
   Paid freight, $20.
   (2) Shipped per Steamer St. Lawrence, and consigned to C.D., Montreal, to be sold on our account and risk.
   Merchandise as per invoice, $5000.
   Paid freight and Insurance, $120.
   (3) Closed A. B's consignment and rendered them an account Sales of the same:
   Our charges for Storage and Advertising, $45·00
   Commission, $60.00.
   A. B's net proceeds, $2300.

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No. 16.

ALGEBRA.

TIME—TWO HOURS AND A QUARTER.

1. Find the lowest common multiple of the expressions, $x^3 - 7x_2 - 4x + 28$, and, $x_3 - 2x^2 - 49x + 98$.

2. Divide, by Horner's synthetic method, $x^4 - 8x^3 + 10x^2 - 33x - 10$ by $x^2 - 7x - 2$.

3. Shew that a quantity can be transposed from one side of an equation to the other by changing the sign.

   Given, $x - \frac{3(x - 5)}{7} - \frac{2(10 - x)}{5} = 3$, find x.

4. Solve the equation, $\frac{x(m - n)}{m + n} - \left(x - \frac{m - n}{m + n}\right)\frac{m + n}{m - n} = \frac{m^2x - n(4m + n)}{m^2 - n^2}$.

5. Solve the simultaneous equations, $x - \frac{m}{y} = 2$, and, $3x - \frac{4m}{y} = 6 - m$.

6. Solve the equation, $\frac{mx + 2}{x - 3} - \frac{mx - n + 2}{x - 7} = 0$.

   What is the value of x when $n = 4m$, $3n + 8$ not ing zero ?

7. Prove that $x^m - y^m$ is divisible by $x - y$ without remainder, m being an odd integer.

   Can $x^m - y^m$ be always divided by $x - y$ without remainder when m is an even integer ?

   Find the remainder when $x^{77} + 77$ is divided by $x - 1$.

8. A traveller sets out to go from M to N, two towns, the distance of which in miles is expressed by a number of two digits; his rate of travelling (number of miles per hour) being expressed by the right hand digit. After travelling for as many hours as he goes miles per hour, he lessens his speed by one mile in the hour; and reaches the end of his journey $6\frac{2}{3}$ hours after starting. Prove that three times the left hand digit of the number, which expresses the distance between M and N, is equal to twice the excess of the right hand digit above unity.

9. A grocer has tea worth $1 per lb.; wishing to cheat, he mixes a certain quantity of it with tea worth 75 cents per lb., and sells the mixture at 95 cents per lb.; which gives him, for 100 lbs. of the mixture, $10 more than the true value. How many lbs. of each sort are there in 100 lbs. of the mixture ?

10. Given $x + \frac{1}{x} = y$. Show that $x^4 + \frac{1}{x^4} = y^4 - 4y^2 + 2$.

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No. 17.

CHEMISTRY, BOTANY AND PHYSIOLOGY.

TIME— THREE HOURS.

1. What is a chemical element? How many elements are known? Name some of the most important.
2. State the laws of chemical combination. What is chemical affinity? State some of its important characteristics
3. Describe the preparation of Oxygen, and give some of its most important properties.
4. State the composition of water. What is the difference between *hard* and *soft* water? Shew how hard water can sometimes be made soft.
5. What is the composition of the atmosphere? Is it a combination or a mixture? State the uses of its principal components?
6. State generally the composition of Nitric, Sulphuric, and Muriatic acid; describe the principal properties and uses of each.
7. State generally the composition of gunpowder, and describe fully the properties of its components and the sources from which we obtain them.
8. What is the difference between cast iron and wrought iron? State fully how the former is converted into the latter.
9. Describe fully the organs of reproduction in a plant. Describe the process of germination.
10. What are the parts of a flower? Give illustrations by diagram, with a full description.
11. Describe the Sclerotic coat and cornea; the Choroid coat. What is the use of the Eustachian Tubes and what passages do they connect?
12. Describe fully the action of the heart.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1872.

No. 18.

EDUCATION.

TIME—ONE HOUR AND FIFTY MINUTES.

1. Draw the ground-plan of a school-house capable of accommodating 80 pupils, showing position of desks, black-board, clothes-rooms, &c., and state dimensions, with what you consider to be the best arrangements for heating and ventilation.
2. How would you organize a mixed school of 300 pupils, with five assistants? State particularly the basis of classification, and the principles on which you would construct a time table for such a school.
3. What method would you adopt in recording relative standing and proficiency? Exhibit a form of Monthly Report to Parents.
4. "Though Grammar be usually amongst the first things taught, it is always one of the last things understood?" Can you explain why this is the case? Suggest a remedy.
5. How would you teach the following subjects?
   1. Geometry, } to a class of beginners.
   2. Composition, }
   3. Arithmetic, } to advanced classes.
   4. Spelling, }
6. Define the limits within which you deem it safe to employ (1) The Monitorial System, (2) Repressive Discipline.
7. State your views with reference to Graded Schools.

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1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1872.

No. 19.

THE SCHOOL LAW OF ONTARIO.

TIME—ONE HOUR AND FORTY-FIVE MINUTES.

1. When should the corporate seal be used by trustees, and when should it not be used by them? Give examples.
2. Trustees wish to enlarge their present school site. Explain fully (1) what are their powers (if any) in such a matter; also, what are respectively the powers (1) of a public meeting, (2) the owner of the site, and (3) the Inspector (if any) in regard to the enlargement?
3. Draw the form of a legal agreement or contract between trustees and a teacher.
4. Describe what are the mutual relations, under the school law and regulations, (1) of the master of a school, of the teacher in the same school, and (2) of the Inspector to both on visiting a school.
5. In how many ways may schools in new and poor townships be aided by the Department and by the Municipal Council? What do the law and regulations require the Inspector to do in both instances? State also, whether it is the Township or County Council which is authorized by law to aid poor schools.
6. Explain the law governing arbitrations and awards under the School Acts.
7. Explain the difference in the law affecting rural trustees, and trustees in cities, towns, and villages, as to (1) annual school meetings, (2) school accounts, (3) the mode of raising school moneys.
8. What are respectively the duties of County, City, and Township Councils in regard to providing funds for Public Schools?
9. Describe the duties of a Public School Inspector in regard (1) to rural school meetings, and (2) to union school assessments.
10. Draw up a form of bond to be given by a collector of school rates and his sureties to rural trustees, and explain in what (if any) respect it differs from one given by a secretary-treasurer to the same trustees.
11. If a Township Council "remodel" the school sections of the Municipality, what is the law in regard to the election of trustees of the sections thus affected?
12. Discuss briefly the superiority of a Township Board of Education over that of the present School Section system, in regard (1) to economy in the number of schools required in the township, (2) the qualifications and salaries of teachers, and (3) the convenience and advantages to the rate-payers of the right which they would have to send their children to any school in the township.

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1st CLASS PROVINCIAL CERTIFICATES.

Commencing 26th December, 1872.

No. 20.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. Prove the Rule for multiplication of decimals. Explain the contracted method, and apply it to find the product of 5·127578 and ·0694526 true to six places of decimals.

2. A person increases his capital annually 20 per cent.; at the end of three years, one year's interest at 8 per cent. on the accumulated capital is $576. With what capital did he start?

3. Extract the square root of ·00093636. Suppose you point thus: $\cdot\dot{0}0\dot{0}9\dot{3}6\dot{3}6\dot{0}$ and extract the square root, find the quantity (to three decimal places) which, multiplied into the erroneous result, will give the true result.

4. The old par of Exchange between the United States and Great Britain was £1 = 4.44\frac{4}{9}$; in 1834 the U. S. Congress reduced the weight of the eagle to 258 grains, and in 1837 fixed its fineness at 900 thousandths pure; the Mint price of English standard gold (22 carats fine) is £3 17s. 10½d. per ounce. From these facts shew the truth of the statement, "By the new par of exchange sterling money is worth 9½ per cent. more than by the old par."

5. A grain dealer laid out a certain sum in oats, 20 per cent. more in barley, and 25 per cent. more in wheat than in barley and oats together; he sold the oats at a profit of 10 per cent., the wheat at a profit of 8 per cent., and the barley at a loss of 6 per cent., and received altogether $2599. Find the amount invested in each kind of grain.

6. If 3 men and 4 boys earn $25·20 in 3 days; and 6 men and 2 boys earn $22·80 in 2 days; find the amount earned by a man and a boy in one day.

7. A person ships 1200 barrels of flour to a commission merchant in Montreal who agrees to sell it on a commission of 2½ per cent. He is instructed to pay the freight charges, which amount to 5 per cent. on the entire sum realized for the flour, deduct his commission of 3 per cent., and then invest the balance in Bank of Montreal stock on a commission of 3½ per cent., which he is to take out of the amount in hand. His entire commission is 472\frac{14}{23}$. At what price per barrel is the flour sold?

8. A merchant added every year 50 per cent to his capital, with the exception of $1600 which is annually withdrawn for expenses; at the end of four years his original capital is quadrupled: find its amount. What is the limit of the rate of gain in order that the other conditions of the question may be possible?

9. Find the sum of money whose true discount for one year at 10 per cent. is greater by 3\frac{58}{189}$ than the sum of the true discounts of one-half of it at 8 per cent. and the other half at 12 per cent. for one year.

10. £6,000 is invested in timber, which, at the expiration of 4 months, is sold for £6,420: the 4 per cent. consolidated funds being at 88$\frac{8}{9}$, find the gain per cent. on the transaction.

11. The diameter of a circle (radius = r) is produced until the part produced is equal to the radius, and from the extremity of the produced line tangents are drawn to the circle; find the area of the figure formed by the tangents and the arc which they intercept; find also the length of the arc.

PROVINCE OF ONTARIO

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1872.

No. 21.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

1. Remark on Grammatical peculiarities in the following words or expressions :— “ children ;” “alms;” “gander;” “ songstress ;” “ The more the merrier ;” “ He is gone a-hunting ;” “ The house is building.”

2. Illustrate fully the “ Adjective in predicate.”

3. Give as fully as you can the Syntax of the Subjunctive Mood.

4. Name the verbs which specially belong to the class, called “ copulative,” and explain their office in Analysis. How would you deal, in Analysis, with the Imperative and Infinitive Absolute?

5. Parse the italicised words in the following :—
   (*a*) Who here will envy *whom* the highest place exposes ?
   (*b*) *High* on a throne—Satan exalted sat.
   (*c*) Hypocrisy, *detest* her as we may &c.
   (*d*) He could afford to suffer with those *whom* he saw suffer.
   (*e*) I protest by *your* rejoicing which I have &c. 1 *Cor.* XV.

6. Correct, or justify, the following, giving in each case your reasons :—
   (*a*) Scarce the dew has dried, upon the leaf, than they too fade. *Smith's Sir Wm. Crichton.*
   (*b*) They were planned by a clever servant who, to say all that can be said in his praise, is that he is worthy of such a master as he has. *Cobbett's Rural Rides.*
   (*c*) Sixteen have been sentenced to suffer death, but two only were left for execution. *Ibid.*
   (*d*) We will not serve thy gods, nor worship the golden image. *Daniel* iii, 18.
   (*e*) All that is favoured by good use is not proper to be retained. *Murray.*

7. Name, explain. and classify the figures which occur in the following :—
   (*a*) His arm is conquest, and his frown is fate. *Day.*
   (*b*) Prayer must be animated. The arrow that would pierce the clouds must part from the bent bow and the strained arm. *World without Souls.*
   (*c*) Man took man ; shield met shield ; steel mixed its beams with steel. Darts hiss through the air ; spears ring on mails ; swords on broken bucklers bound. *Macpherson's Ossian.*
   (*d*) He too is witness, noblest of the train that wait on man, the flight-performing horse. *Cowper.*

8. Give specimens of the Spondee, Dactyle, and Anapest, and describe the Spenserian Stanza.

9. Scan the following :—
   (*a*) Woods, that wave o'er Delphi's steep.
   (*b*) Man's feeble race what ills await.
   (*c*) A region of emptiness, howling and drear.

10. Analyze the following, and write short notes on the words in italics :—

And that her sacred book, with blood *y-writ*
That none could read, except she did them teach,
She unto him disclosed every whit ;
And heavenly *documents* thereout did preach,
That weaker wit of man could never reach ;
Of God ; of Grace ; of Justice ; of Free-will ;
That wonder was to hear her godly speech ;
For she was able with her words to kill,
And raise again to life the heart that she did *thrill.* SPENSER—FAERIE QUEEN.

11. Give some examples of families of words from a common root.

12. Give the Etymological Analysis of the following words, mentioning, in each case, prefix, or affix, root, literal meaning, and ordinary signification :—Advocate ; adherent ; disparity ; colloquial ; ambitious ; transgression ; degeneracy ; declension, (connect grammatical sense with root) ; dissection ; pilgrimage ; inarticulate ; compunction.

13. Refer each word in the following extract to the language from which it is derived :—

Great consuls in the mighty republic of English letters, to them alone belong the honours of the ivory chair, the robe with purple hem, and the rod-surrounded axe.

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COMMENCING 26th DECEMBER, 1872.

No. 22.

CHEMISTRY.

TIME—TWO HOURS.

1. What do you mean by the several terms : "Equivalent weight," atomic weight, and molecular weight ? State and remark upon the equivalent, atomic, and molecular weights, respectively, of Oxygen, Hydrogen, Phosphorus, Chlorine, and Sulphur.

2. Write the formulæ of some well known compounds containing Oxygen, on the assumption that its atomic weight is 8, and the formulæ of the same compounds on the assumption that the atomic weight is 16. Give reasons which would induce you to adopt one of these atomic weights in preference to the other.

3. What weight of Potassium Chlorate will be required to fill a gas box of a capacity of 20 litres, the temperature of the room being 15° C , and the pressure of the air being at 750° mm ?

4. How is sulphuric acid made ? Explain the changes which take place in the process.

5. A vitriol maker prepares 100 tons of vitriol of specific gravity 1·6, containing 70 per cent. of acid ; how many tons of pyrites containing 42 per cent. of sulphur must be burnt for this purpose ? Supposing that 3 per cent. of the theoretical yield of sulphur remained unburnt in the pyrites, what would be the difference in the production of sulphuric acid ?

6. Give the preparation and properties of corrosive sublimate. How may the latter be detected ?

7. Required 250 tons of soda chrystals ; what weight of salt and pure sulphuric acid will be needed ?

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Commencing 26th December, 1872.

No. 23.

PHYSICS.

TIME—TWO HOURS.

1. State what you know regarding the absorption of radiant heat by solids, liquids, and gases. Explain in accordance with the mechanical theory of heat, what is meant by radiation and absorption.
2. What is meant by the "Mechanical Equivalent of Heat?" Define the term foot-pound.
3. Explain the action of freezing mixtures.
4. How is it that under such widely varying gradations of external heat, the temperature of the human blood is approximately constant in all climates?
5. Why is it that when you look straight down into transparent water it appears shallower than it really is? Deduce from this apparent lifting up of the bottom the manner in which a stick appears bent when thrust obliquely into water.
6. State what you know regarding Fraunhofer's lines.
7. What is meant by the dispersion of light? Can dispersion be neutralized without neutralization of refraction? State what you know regarding achromatism.
8. Describe and illustrate by diagram the ordinary *Camera Obscura* used by photographers.
9. Describe the construction and action of an electric machine.
10. Give the two theories of frictional electricity, with arguments in favour of each.
11. What are the objections to the old form of galvanic batteries? How far avoided in Daniel's? In what direction does the positive current move in all couples composed of a liquid and a metal?
12. Describe and illustrate by diagram a cell of Grove's Battery. You have materials for a battery of five cells of Grove's construction; describe fully how you would put them together so as to set the battery in action.

PROVINCE OF ONTARIO.

XAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE
COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

Commencing 16th December, 1872.

No. 24.

NATURAL PHILOSOPHY.

TIME—THREE HOURS.

1. A sphere, whose radius is 6-inches, is placed under the partially exhausted receiver of an Air-pump, where the elasticity of the air is less than that of the free external air in the proportion of 1 : Π (Π = 3·1416). Find the pressure of the rarified air on the surface of the sphere, the height of the barometric column being 30 inches, specific gravity of mercury 13·57 times that of water, and the weight of a cubic foot of water 1,000 oz.

2. A piece of wood floats in fresh water, the portion immersed being $\frac{7}{10}$ of the whole. Another piece of wood, of the same volume as the former, but weighing 10 lbs. less, floats in salt water, the portion immersed being $\frac{26}{41}$ of the whole. The weight of a cubic foot of water being 1,000 oz., and the specific gravity of salt water being 1·025, while that of fresh water is unity, find the weight of each of the pieces of wood.

3. A hollow sphere is filled with water. Prove that the pressure on the internal surface of the sphere is equal to three times the weight of the water.

4. How is a uniformly accelerating force measured?
   When a body is moving with a velocity which is not uniform, how is its velocity at any instant measured?
   A body, projected vertically upwards from a point on the earth's surface, has, when it has risen to a height of 63 feet, a velocity of 8 feet per second. Find the velocity of projection.

5. Two particles, each moving under the influence of a uniformly accelerating force equal to that of gravity at the earth's surface, pass, the one through A towards B, and the other through B towards A, at the same instant; the former having, at A, a velocity of 44 feet in the second; while the latter has, at B, a velocity of 20 feet in the second. The distance between A and B being 480 feet, where do the particles meet.

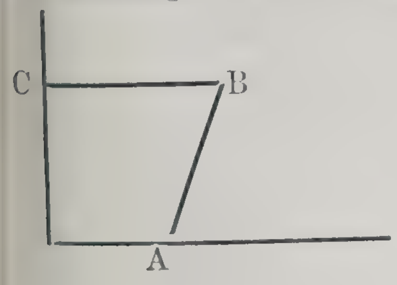
6. A straight lever A C B, whose fulcrum is C, is kept at rest by two weights, P and W, applied at A and B respectively. If D be any point in B A produced, show that

$$P \times AD + W \times BD = (P + W) \times CD.$$

7. A particle placed at E, the middle point of A B, a side of the square A B C D, is acted on by three forces; one of 5 lbs in the direction E A; a second of $5\sqrt{5}$ lbs., in the direction E D; and the third of $10\sqrt{5}$ lbs., in the direction E C. Prove that the rseultant of these forces is at right angles to A B; and find its magnitude.

8. A hollow cylinder is filled with water. Find the proportion between its height and the radius of the base in order that the pressure of the water on the interior of the cylinder may be the same, whether the cylinder stand with its base on a horizontal floor, or lie on its side on the floor.

9. A string C B, which is fastned at one end to a fixed point C in a wall, has its other end attached to B, one of the extremities of a uniform heavy beam A B, whose other extremity is on the ground at A. The string C B is horizontal, the plane of C B A being vertical. The beam B A is prevented from sliding by friction. If the length of B A be 13 feet, its weight 192 lbs., and the perpendicular height of B above the ground 12 feet; find the reaction (vertical) on the beam at A, and the tension of the string C B.



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2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

No. 25.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1. (*a*) Charles the First's Second Parliament, meeting in 1626, "prepared to impeach Buckingham." Why? Did the impeachment proceed? If not, what hindered it from going on? What fate ultimately befell Buckingham?

   (*b*) When did the Long Parliament begin to sit? How many Parliaments had been called during the eleven years preceding? And who were the principal ministers of Charles during these years?

   (*c*) Who proposed the revival of Ship-money in the reign of Charles? State the grounds of the objection of the English people to the tax.

2. (*a*) In the reign of what English Sovereign did the annexation of Ireland to England take place? Refer to the occupations of the mass of the Irish people at this period—their clothing—their houses. Much or any commerce at the Irish ports? Who were the Ostmen?

   (*b*) In what reign was Poyning's Law passed? What did it enact?

   (*c*) What policy was pursued in Ireland by Sir John Perrot in the reign of Elizabeth?

   (*d*) Give an account of the Irish rebellion in the latter part of Elizabeth's reign.

   (*e*) "The effects of 'Thorough' upon Ireland have been already noticed. The reaction now began." (Text-book).—What was the scheme called 'Thorough'? How, and with what immediate effects, was it carried out in Ireland? Notice some prominent incidents of the reaction that ensued.

3. (*a*) "In the war which arose between Charles V. and Frances I., Henry at first sided with"—whom? Which Henry was this? Refer to any operations of the English troops against the power opposed to that with which Henry at first sided.

   (*b*) What led Henry afterwards to turn against the monarch with whom he at first sided?

4. (*a*) Give an account of the dwellings of the English poor in the Tudor period.

   (*b*) Give an account of the country gentlemen, and also of the yeomen or small farmers, under the Stuarts.

   (*c*) By whom was the general use of the chief flesh meats found on our tables introduced into England? Any illustration of this in our language?

5. Give the dates of the following events, or indicate the periods as nearly as possible:—Charter granted to the East India Company;—printing introduced into England;—rise of the Star-chamber;—treaty of Bretigny (what were the provisions of this treaty?)—the founding of the House of Commons; (when did the Lords and Commons begin to sit in separate chambers?)—the Act of Settlement (mention its leading provisions).

6. (*a*) Describe the circumstances under which the institution of the class of Roman magistrates, called Tribunes of the Plebs, took place. What was the number of the Tribunes? How long did they hold office? What powers and privileges did they possess.

   (*b*) What concession was made to the Plebeians by the Licinian Rogations?

   (*c*) Describe the part taken by Tiberius Gracchus, in the struggle between the masses of the people and the nobility.

7. Give an account of the career of Philip, father of Alexander the Great.

8. Give a sketch of the reign of Henry IV. of France.

9. Write a sketch of the History of Canada from the inauguration of British rule till the Division of the Province of Quebec.

10. Describe the causes in operation, in Lower Canada and Upper Canada respectively, which led to the rebellion of 1837.

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1st CLASS PROVINCIAL CERTIFICATES.

Commencing 26th December, 1872.

No. 26.

BOOK-KEEPING.

TIME—ONE HOUR AND A HALF.

1. Define the following terms :—Book-keeping, Day Book, Cash Book, Bill Book, Invoice, Profit and Loss acct., Posting, Bill of Exchange.
2. Distinguish Double and Single Entry ; Personal, Real, and Fictitious Accounts.
3. May 30, A. Smith enters into Partnership with J. Long, to carry on a Retail dry-goods business in Toronto. Smith invests a store worth $5,000, and the lot on which it stands worth $3,000, with stock valued at $12,000; and Long puts in $10,000 in cash.

June 1. They purchase from McMaster & Brothers, goods to the amount of $4,000, paying $2,000, cash and giving note at three months for balance. Bill Stamps 60 c Cartage $6. Labor $3.

June 2. They purchase from Thos. Day, of Montreal, goods to the amount of $4,000, and he draws on them at 10 days' sight for the whole amount payable at the agency of the Merchants' Bank, Toronto. They purchase on the same day from Brown Bros, Blank Books to the amount of $50, and Stationery from Copp, Clark & Co., $40. Paid for labor $5. June 3 They sell R. Johnson 20 yds oil-cloth @ 75 cts, and 50 yds carpeting @ $2·50, taking his note for $100, and receiving the balance in cash. They sell Thos Jackson 20 yds sheetings @ 8 cts, 50 yds red flannel @ 40 cts, 15 yds muslin-de-laine @ 35 cts, 20 yds alpaca @ 60 cts, and receive from him cash $35.

Thos. Day's Draft of $4,000 is presented and accepted. They insure building for $5,000, at 1 %, stock for $12,000 at $\frac{3}{4}$ %. On the night of June 3, they are burnt out, but save a few goods &c. June 4. Goods arrive from Montreal. They pay freight and cartage $40. June 8. All goods sold at auction ; new goods bring $4,200, and damaged goods $2,000—the latter for cash for benefit of Insurance Co.; the former in equal amounts to R. James, T. Patton, and M. Sims, whose notes for three months are given. Expenses of sale $50.

(1) Enter the above in Day Book, Journalize and Post (Double Entry).

(2) Make proper entries in Cash Book and Bill Book.

(3) Make balance sheet—showing state of affairs.

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COMMENCING 26th DECEMBER, 1872.

No. 27.

ALGEBRA.

TIME—TWO HOURS AND THREE-QUARTERS.

1. Investigate a rule for finding the Highest Common Measure of two algebraical expressions. Find the H.C.M. of

$$x^4 - 2x^3 + x^2 - 1, \text{ and } x^4 - mx^3 + x^2(m-1) + x(m-2) - 1.$$

2. Find the three values of the cube root of unity.

3. Four numbers are in Harmonical Progression; 15 times the sum of the second and fourth is equal to 8 times the product of the square of the first by the reciprocal of the third; and the sum of the reciprocals of the four numbers is 14. Find the numbers.

4. A watch is uniformly losing one second in the hour, while another, which indicated noon at the same time with the former, is uniformly gaining one second in the hour. What o'clock is it by the former when the hour and minute hands of the latter are together between 4 and 5 o'clock, P. M.?

5. If $p+q\sqrt{-1}$ be one root of the equation, $x^2+ax+b=0$, show that the other root is $p-q\sqrt{-1}$, p, q, a, b, being understood to be real.

In the equation, $x^2 - \frac{52x}{7} + m = 0$, when $m=3$, the roots are real, being, in fact, 7 and $\frac{3}{7}$. If, beginning at this point, we gradually increase the value of m, the roots remain real till m rises above a certain value. Find the value of m beyond which the roots become imaginary; and shew that, for that particular value of m, the roots are equal.

6. If $\frac{A}{B} = \frac{C}{D} = \frac{E}{F}$, prove that

$$\frac{A^m}{B^m} = \frac{2A^m + 3C^n A^{m-n} + 4E^{m-n-r} C^n A^r}{2B^m + 3D^n B^{m-n} + 4F^{m-n-r} D^n B^r}$$

Given $\frac{1-x}{1-y} = \frac{2-9x+x^2}{2-7y+y^2} = \frac{5+10x-x^2}{1+8y-y^2}$, find x and y.

7. Prove that the equations,

$$ax^2 + bx + c = 0,$$

$$mx^2 + nx + \frac{nc}{b} = 0,$$

cannot have one root common, unless they have both roots common.

8. Solve the equations,

$$x^3 + y^3 + xy(x+y) = 108.$$
$$x^2 + y^2 + (x+y) = 24.$$

9. Given $(\sqrt{1+x}-1)(\sqrt{1-x}+1) = nx$, it is required to find a value of x distinct from zero.

10. Between two towns, A and D, two stations, B and C, occur in succession; the distances AB, BC, CD being in Arithmetical Progression. Two travellers, P and Q, set out from B and D respectively, the former to go to D, and the latter to go to A; and walking each at a uniform pace, they reach C together, $3\frac{1}{3}$ hours after starting. Q then lessens his rate of travelling by half a mile in the hour, while P increases his rate by 2 miles in the hour; and Q reaches B half an hour before, and A three-quarters of an hour after, the arrival of P at D. Find the distance between A and D.

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COMMENCING 26th DECEMBER, 1872.

No. 28.

ENGLISH LITERATURE.

TIME—TWO HOURS AND A QUARTER.

1. Give some account of the principal Latin writers of the Norman Times. What were the Romance tongues of France?
2. Write notes on Sir Walter Raleigh; Goldsmith; Burns; and Cowper.
3. Give the history of the introduction of Printing into England.
4. Write brief critical comments on "The Rape of the Lock;" "The Task;" Clarendon's "History of the Great Rebellion," and Carlyle's "French Revolution."
5. Enumerate the principal forms and schools of poetry, and show what it is that lifts poetry above the level of mere verse.
6. Write a brief sketch of American Literature.

ENGLISH COMPOSITION.

Any one of the three following subjects may be selected:—

1. The late war between France and Prussia.
2. Christianity as a civilizing agency.
3. Woman's sphere, and the education to fit her for it.

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1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1872.

No. 29.

BOTANY AND AGRICULTURE.

TIME—ONE HOUR AND A HALF.

1. What organs appear in the more perfect plants, and in what divisions are they comprised?
2. Give the function of the flower, its origin and its essential and accessory parts.
3. Describe the nature and chief varieties of roots, and distinguish between them and underground stems.
4. "As to the Apex or Point leaves are Pointed, Acute, Obtuse, Truncate, Retuse, Emarginate, Obcordate, Cuspidate, Mucronate." Sketch these different forms.
5. "There is no separate set of vessels, and no open tubes for the sap to rise through in an unbroken stream, in the way people generally suppose." Comment on this passage.
6. The great series of Flowering Plants is divided into two *classes.* Describe these classes.
7. Give the chief characteristics of the order *cruciferæ*, and name some common examples of this order.
8. To what family does the following description apply? Leaves alternate with stipules and regular flowers; their generally five petals (sometimes wanting) and stamens (generally numerous, at least above 10) inserted on the persistent calyx. The seeds are few and their kernel is embryo?
9. Shew how to distinguish between the organic and inorganic constituents of soils and to determine their relative proportions?
10. How may the defects of sandy and of argillaceous soils be respectively remedied?
11. What principal elements are wanting in barren soils? Detail the means you would employ for the improvement of such soils.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1872.

No. 30.

EUCLID.

TIME—TWO HOURS AND THREE-QUARTERS.

1. If two straight lines cut one another within a circle, the rectangle contained by the segments of one of them shall be equal to the rectangle contained by the segments of the other. (Take the case where one of the lines passes through the centre, and cuts the other, which does not pass through the centre, but not at right angles.)

2. Let the angles of a regular pentagon, inscribed in a circle, be at the points A, B, C, D, E; and through these points respectively draw the straight lines GH, HK, KL, LM, MG, touching the circle, so as to form the figure GHKLM. From the centre F draw the lines FB, FK, FC, FL, FD. Prove, then, as in the 12th Proposition of Book IV., that the angle CFK is equal to the angle CFL.

3. Triangles of the same altitude are to one another as their bases.

4. The sides about the equal angles of equianguler triangles are proportionals; and those which are opposite to the equal angles are homologous sides.

5. Parallelograms which are equianguler to one another have to one another the ratio which is compounded of the ratios of their sides.

6. Let ABCD be a quadrilateral figure inscribed in a circle. Draw the diagonals AC and BD. Then, if AD = AC, and BD = 2BC, a line drawn from C, parallel to AB, shall bisect AD.

7. From BD, the diagonal of a parallelogram ABCD, let a part BE be cut off equal to one-third of BD; and let the straight line AE produced meet DC produced, in F. Prove that DC = CF.

8. Let the circles EBM and FCN, which lie outside of one another, and whose centres are A and D respectively, have a common tangent EF; and let BG and CH, tangents to the circles EBM and FCN at B and C, where the straight line ABCD cuts the circumferences of these circles respectively, meet EF in the points G and H. Then if the radii of the circles EBM and FCN be r and R respectively, and the tangents BG and CH be t and T respectively, prove that

$$rR = tT, \text{ or } \frac{r}{R} = \frac{t}{T},$$

according as EF does, or does not, intersect AD between A and D.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1872.

No. 31.

GEOGRAPHY.

TIME—TWO HOURS.

I.—1. Define Colures, Equation of Time, Precession of the Equinoxes, Apogee, Perigee, and distinguish between the Solar and Sidereal Years.

2. State the law which determines the curvilineal motions of the planets, and illustrate by diagram.

3. Explain fully, by diagram and otherwise, the Solar and Lunar Eclipses.

4. Explain the following phenomena :—Dew, Twilight, Rainbow.

II.—1. If two places are situated on different meridians, and in different hemispheres, how may the distance between them be determined on a globe, and reduced to statute miles ?

2. Give the height of Mount Everest or Chimborazo, and ascertain by what elevation it will be proportionately represented on a globe 18 inches in diameter.

III.—1. The waters of the ocean are said to accumulate in the Gulf of Mexico ; what evidence of this ? To what causes is it due ? Name and trace the course of the strong current produced by these waters in returning to the Atlantic.

2. Sketch the water system of South America, explaining what is meant by the *Bore* of the Amazon and the *Cassiquiare.*

3. Trace the course of the Mississipi, naming its tributaries and contiguous States, with their capitals.

4. Describe as fully as you can the Maritime Provinces of the Dominion.

5. Name the Counties of Ontario (with their county towns) on the St. Lawrence, and state the position of the following, in that, or in the adjoining, Province :—Orillia, Pembroke, Sault Ste. Marie, Perth, Alumette Island, Lake St. John, Lake Memphremagog, Hull, St. Hyacinthe, Three Rivers, Kamouraska.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1872.

No. 32.

ZOOLOGY & PHYSIOLOGY.

TIME—ONE HOUR AND A HALF.

1. Give the meaning of each of the following terms :—
   Species, Genus, Order, Class.
2. Name and distinguish the Classes of the Vertebrata.
3. State the distinguishing features of the Mollusca, and name their leading groups.
4. What are the characteristics of the order Rodentia. Give examples of that order.
5. To what sub-kingdom, class, and order do the Seal and the Porpoise respectively belong ? What are the most striking differences between these animals ?
6. What are thr Protozoa ? Describe the Rhizopoda, Polycystina and the Porifera.
7. Arrange under their proper order, class and sub-kingdom the following animals :—The Dog, Cow, Whale, Kangaroo, Oyster, Cod, and Sea Anemone, giving the scientific names where you can.
8. Name the bones of the Skull, and describe their situation.
9. Give the names and positions of the Salivary glands, What is their action during mastication ?
10. Describe the structure of the skin and its functions.
11. Sketch and classify the human Teeth, and give the Dental formula.
12. Describe the action of the Lacteals, the Lymphatics, and the Thoracic duct.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th DECEMBER, 1872.

ANSWERS TO QUESTIONS.

ALGEBRA—SECOND CLASS.

1. $x^4 - 53x^2 + 196$.
3. $x = 5$.
4. $x = 1$.
5. $y = 1$, $x = 2 + m$.
6. $x = \frac{3n+8}{n-4m}$. When $n = 4m$, and $3n + 8$ is not zero, no finite value of x satisfies the equation. To satisfy the equation, x must be either *plus infinity*, or *minus infinity*.
7. $x^m - y^m$ can always be divided by $x - y$ without remainder, when m is an integer. The remainder is 78.
9. 40 lbs. at \$1, and 60 lbs. at 75 cents.

NATURAL PHILOSOPHY—SECOND CLASS.

1. 100 lbs.
7. Take G, the middle point of AD; then AEFG is a parallelogram; therefore the resultant is EG, or 1 foot.
8. W = 20lbs.
10. 3198 oz.

ARITHMETIC—THIRD CLASS.

1. 7.
2. \$261·268$\frac{1}{2}$.
3. \$113·00159 grains.
4. \$158.40.
5. 18$\frac{1}{3}$, 22.
6. \$160, \$240.
7. Book-work.
8. £199$\frac{41601}{460800}$.
9. 9$\frac{31}{41}$.
10. 47·9406$\frac{1}{4}$ lbs.
11. \$59·69$\frac{1}{3}$.
12. \$700, \$756.

ARITHMETIC SECOND CLASS.

1. 7$\frac{13}{18}$.
2. Book-work.
3. \$2,000.
4. 2$\frac{47}{64}$ guineas.
5. 2·2360679774, ·4490135954, 2·6180339887, ·7453559924.
6. \$1320, \$1452
7. \$4744·186.
8. 77785714$\frac{2}{7}$ tons.
9. 55c., 75c.
10. \$2000, \$3000, \$4000.
11. 272 rods.
12. 50.

PROVINCE OF ONTARIO.

Department of Public Instruction.

PUBLIC SCHOOL TEACHERS' EXAMINATION, DECEMBER, 1872.

EXTRACTS FROM THE OFFICIAL REGULATIONS.

Time and Place of each Examination.—The half-yearly examination of candidates for Second and Third Class Certificates shall be held in each County Town in such building as may be appointed by the Inspector, who shall give at least three weeks' public notice thereof, in such manner as he shall deem expedient. The examination of candidates for First class Certificates shall be held at the same place, [at the time mentioned below;] but all candidates for First-Class Certificates, who do not already possess Second-class Provincial Certificates, shall be required to previously pass the examination for such Second-class Certificate. No person is eligible to be a candidate for a Second-class Certificate, unless he shall have previously obtained a Third-class Certificate under the present system of examination, or a First or Second-class Certificate under the former system.

Proceedings at each Examination.—The Inspector shall preside at the opening of each examination; and at 9 o'clock on the morning of the first day, and in the presence of such of his colleagues as may be there, and of the candidates, he shall break the seal of the package of examination papers received for that examination, from the Education Department. He shall also break open the seal of each additional packet of examination papers as required, in the presence of a co-examiner and of the candidates. He shall further see that at least one examiner is present during the whole time of the examination, in each room occupied by the candidates. He shall, if desirable, appoint one or more of his co-examinners (1) to preside at the examination in any of the subjects named in the programme; (2) to read and report upon the answers as they are received.

DAYS AND HOURS OF EXAMINATION FOR SECOND AND THIRD CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS,

COMMENCING 16TH DECEMBER, 1872.

DAY.	TIME.	SUBJECT.	CLASS.	NO. OF PAPER.
Monday, 16th Dec.,	2—4 30 P. M.	Natural History, Botany and Agriculture. (Special Paper.)	(2)	(1)
Tuesday, 17th "	9—12 Noon.	English Grammar and Etymology.	(2, 3)	(2, 3)
	1 15—4 15 P. M.	Arithmetic and Mensuration.	(2, 3)	(4, 5)
Wednesday, 18th "	9—11 30 A. M.	Education and School Law.	(2, 3)	(6, 7)
	11 40—12 40 P. M.	Reading and Dictation.	(2, 3)	(8)
	2—4 30 P. M.	History.	(2, 3)	(9)
Thursday, 19th "	9—11 A. M.	Geography.	(2, 3)	(10, 11)
	11 10—12 40 P. M.	Music and Drawing.	(2)	(12)
	2—4 30 P. M.	Euclid.	(2)	(13)
Friday, 20th "	9—11 30 A. M.	Natural Philosophy.	(2)	(14)
	11 40—1 P. M.	Book-keeping.	(2)	(15)
	2—4 15 P. M.	Algebra.	(2)	(16)
Saturday, 21st "	9—12 Noon.	Chemistry, Botany, and Physiology.	(2)	(17)

NOTE.—Should the time allowed for Reading and Dictation be found insufficient, the Examiners will make such other special arrangements for Reading as may seem to them most convenient.

DAYS AND HOURS OF EXAMINATION FOR FIRST-CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS,

COMMENCING 26TH DECEMBER, 1872.

DAY.	TIME.	SUBJECT.	NO. OF PAPER.
Thursday, 26th Dec.,	2—3 50 P. M.	Education.	(18)
	4 5 45 P. M.	School Law.	(19)
Friday, 27th ..	9—12 Noon.	Arithmetic and Mensuration.	(20)
	1 15—4 15 P. M.	English Grammar and Etymology.	(21)
Saturday, 28th ..	9—11 A. M.	Chemistry.	(22)
	11 10— 1 10 P. M.	Physics.	(23)
Monday, 30th ..	2 15—5 15 P. M.	Natural Philosophy.	(24)
Tuesday, 31st ..	9—11 15 A. M.	History.	(25)
	11 30—1 P. M.	Book-keeping.	(26)
	2—4 45 P. M.	Algebra.	(27)
Thursday, 2nd Jan.,	9—11 15 A. M.	English Literature and Composition.	(28)
	11 30—1 P. M.	Botany and Agriculture.	(29)
	2—4 45 P. M.	Euclid.	(30)
Friday, 3rd ..	9—11 A. M.	Geography.	(31)
	11 15—12 45 P. M.	Zoology and Physiology.	(32)

EDUCATION OFFICE,
TORONTO, NOVEMBER, 1872.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES—DECEMBER, 1872.

Values assigned by the Central Committee of Examiners.

See "General Regulations respecting the Examination of Candidates," &c., Nos. 7 and 8.

(1) [illegible] — Total value of the paper, 150; each question of same value.

(2) (3) ENGLISH GRAMMAR

Questions		1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of Marks for perfect answers.	(Second Class)	12	15	25	20	18	16	24	30	5	20	20	20	225
	(Third Class)	15	20	8	8	8	15	24	20	30	24	10	18	200

(4) ARITHMETIC............ (Second Class)—Total value of the paper, 200; each question of the same value.

(5) DO. .... (Third Class) Total value of the paper, 200; value of each of the first four questions, 12; of each of the others, 19.

(6) EDUCATION & SCHOOL LAW. (Second Class)—Total value of the paper, 228; each question of same value.

(7) EDUCATION & SCHOOL LAW. (Third Class)—Total value of the paper, 152; each question of same value.

(8) READING & DICTATION. [illegible] may be reckoned, 150

(9) HISTORY................ Number of Marks for perfect answers.
(Second Class)—Value of each question to be answered by Candidates for a Second Class Certificate, 15. Total value of the paper, 150
(Third Class)—Value of each question to be answered by Candidates for a Third Class Certificate, 15. Total value of the paper, 150.

(10) (11) GEOGRAPHY

Questions		1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of Marks for perfect answers.	(Second Class)	10	10	10	15	12	15	16	12	5	15	10	20	150
	(Third Class)	15	25	20	13	13	13	10	16	10	15			150

(12) PRINCIPLES OF VOCAL MUSIC AND LINEAR DRAWING.

(13) EUCLID

Questions	1	2	3	4	5	6	7	8	Total.
Number of Marks for correct answers.	20	20	20	20	20	25	25	25	175

(14) NATURAL PHILOSOPHY

Questions................	1	2	3	4	5	6	7	8	9	10	Total.
Number of Marks for correct answers.	18	18	9	20	20	10	20	20	20	20	175

(15) BOOK-KEEPING.

Questions	1	2	3	4	5	6	7	8	Total.
Number of Marks for correct answers.	6	6	6	6	6	20	25	25	100

(16) ALGEBRA

Questions	1	2	3	4	5	6	7	8	9	Total.
Number of Marks for correct answers.	19	19	19	19	19	19	19	23	19	175

(17) CHEMISTRY, BOTANY AND PHYSIOLOGY. Total value of the paper, 200; each question of same value.

NOTE.—On the present occasion, the general standing of a candidate is to be determined irrespectively of his proficiency in *Music* and *Drawing*, but candidates who pass a satisfactory examination in these branches, shall receive a certificate to that effect. The General Regulations gives the Board of Examiners authority to "obtain the services of special examiners in Vocal Music and Linear Drawing, in case members of the Board are not familiar with those subjects."

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 14th JULY, 1873.

No. 1.

ZOOLOGY, BOTANY, AND AGRICULTURE.

(SPECIAL PAPER.)

TIME—TWO HOURS AND A HALF.

1. Describe the Echidnæ and the Ornithorhynchus.
2. "The Ungulated Pachydermata may be divided into six families;" name them.
3. Give the classes of the Carnivora. Sketch the skeleton of a seal.
4. "There are three principal families of Insect-eating animals;" name and briefly describe them.
5. Give an account of the formation of Madrepores. How does this formation differ from that of corals?
6. What are the Rhizopoda? State the difference betweem Foramenifera and Polycystina.
7. "The nourishment which the mother-plant provides in the seed, is not always stored up in the embryo." Explain and illustrate.
8. Describe the various modes in which Perennials "provide a stock of nourishment, to begin the new growth."
9. Name some of the principal kinds of manures, and state the circumstances in which each may be a advantageously applied.
10. What is meant by the rotation of crops? State the advantages of a judicious system of rotation.
11. Describe a judicious treatment for (1) sandy soils, (2) heavy clay soils.
12. Describe minutely how good butter may be made.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 14th JULY, 1873.

No. 2.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

Once indeed,
Warmed with his wines, or taking pride in her,
She looked so *sweet*, he kissed her tenderly,
Not knowing what possessed him : that one kiss
Was Leolin's one strong rival upon earth ;
Seconded, for my lady followed *suit*,
Seemed hope's returning rose : and then ensued
A Martin's summer of his faded love,
Or ordeal by kindness ; after this
He seldom crost his child without a sneer ;
The mother flowed in shallower acrimonies ;
Never one kindly smile, one kindly word ;
So that the gentle creature, shut from all
Her charitable use, and *face* to face
With twenty months of silence, slowly lost,
Nor greatly cared to lose, her hold on life.
Last, some low fever, raging round to spy
The weakness of a people or a house,
Like flies that haunt a wound, or *deer*, or men,
Or almost all that is, *hurting* the *hurt*—
Save Christ *as* we believe *him*—found the girl
And flung her down upon a couch of fire,
Where, careless of the household faces *near*,
And crying upon the name of Leolin,
She, and with her the race of Aylmer, passed.
—TENNYSON : *Aylmer's Field.*

1. Give the full syntactical parsing of the thirteen italicized words.

2. Divide the last nine verses into propositions, stating their kind and connection, and fully analyze them.

3. Parse the italicized words in :

"Gold and silver are the most convenient metals to use *as money*."
"There is nobody *but thinks* you *ill-used*."
"Bread *enough and to spare*."

4. State clearly, giving reasons, whether you consider the italicized words in the following sentences nouns, adjectives, or pronouns.

"Nearly *all* were gone."
"The *one* is good, the *other* bad."
"*That* is my father."
"The only *good* on earth was pleasure, not to follow *that* was sin."
"*Many* are called."
"The rule of the *many*."
"Amid so many difficulties *one* does not know what to do."

5. Point out grammatical peculiarities in the following quotation :

"Pray find some cure or sinecure
To feed from the superfluous taxes
A friend of ours—a poet : fewer
Have fluttered tamer to the lure
Than he."

6. "A verb is a word which makes an assertion." Discuss the defects of this definition.

7. What are the principal parts of *travel, smell, benefit*.

8. What prepositions should follow : Glad, true, insinuate, intervene.

9. Give examples of verbs of the strong, and of verbs of the weak, conjugation.

10. Give examples of :

(*a*) Derivatives formed by merely changing the radical vowel.
(*b*) Primitive words formed on the principle of imitation
(*c*) Derivatives from *Dolos, hodos, luos, pingo, olo* or *olesco, linquo, fligo, arceo, tero, cello.*

11. Derive : Where, ephemeral, alone, before, river, rapturous, current, month, pain, flood, generally, number, agency, viscous, diabolical, azote, stenography, pagoda, giving the etymological analysis where you can.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 15th JULY, 1873.

No. 3.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME.—THREE HOURS.

His mean and recent trade *cast*, *indeed*, an air of ridicule on his elevation ; but his birth could not be more obscure *than* was *that* of the greater part of his rivals, *who* were born of peasants and enlisted in the army *as* private *soldiers*.—Gilbon.

1. Divide into propositions and analyze the passage from Gibbon printed above.

2. Parse the eight italicized words.

3. Write the plural of Cargo, Potato, Attorney, Appendix, Deer, Sow, Die, Cry.

4. Give examples of the different methods of forming the feminine of nouns.

5. Define Mood, Voice, Tense, Case.

6. Which of the following words are qualifying adjectives ? All, Square, Composite, Kind, Some, Handsome, Negative.

7. Give in full any six rules of syntax of which the passage for analysis affords examples, and connect them with the words which illustrate them.

8. Re-write the passage for analysis, substituting a passive form for the active transitive verb.

9. Classify the prefixes and affixes occurring in the following words according to—

   (*a*) Their meaning.
   (*b*) Their derivation.

   Education, Derivative, Implacable, Enlist, Spacious, Barrenness, Bishopric, Wisdom, Vendor, Purchaser, Slimy, Blackish, Refit, Concur, Coalesce, Curvature.

10. Correct when necessary the spelling of the following words : Blueish, Truely, Responsable, Capable, Allegator, Alledge, Cupola, Antient, Beleive, Bugbare, Etheopean, Heinous.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 14th JULY, 1873.

No. 4.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. Show that L. C. M. of two or more fractions in lowest terms, is the L. C. M. of their numerators, divided by the G. C. M. of the denominators; and that their G. C. M. is the G. C. M. of the numerators divided by the L. C. M of the denominators.

2. Find in grains the least weight that can be expressed by an exact number of ounces in both Troy and Avoirdupois weight.

3. Prove the rules for converting the various kinds of decimals into vulgar fractions.
Shew that, in converting a fraction in its lowest terms to a decimal, the result will be a finite decimal, or a mixed circulating decimal, or a pure circulating decimal, according as the denominator contains only the factors of 10. *other* factors also, *none* of such factors.

4. The officers of a regiment are ·042 of its whole strength ; 50 privates are added, and then the officers are .040 of the whole : Find the number of officers and the entire number of men in the regiment at first.

5. Prove the rules (without formulas) for (1) Simple Interest, (2) Discount, (3) Compound Interest.

6. A man has capital which he invests to produce 5 % per annum ; every year he adds one-fourth of his income to his original investment : in how many years will his income be three times what it was the first year, given log. 2 = ·301030, log. 3 = ·477121 ?

7. Give complete explanations of the analyses of the following questions : (1.) An agent received $56 for selling grain on a commission of 4 %; find value of grain sold. (2.) A person receives $600 from an 8 % bank dividend ; how much stock does he own ? (3.) Sold stock at a discount of $7\frac{3}{5}$ % and make a profit of 5 %; at what rate of discount was the stock purchased ? (4.) A shipment of flour was insured at $4\frac{3}{8}$ % to cover $\frac{5}{8}$ of its value, the premium paid being $122.50 ; what was the flour worth ?

8. My agent in Montreal sold a shipment of flour at $8 a barrel on a commission of 3 %; I then instruct him to purchase certain goods for me on a commission of 2 % ; his whole commission was $500 ; find how many barrels of flour were shipped.

9. Give analyses for (1) the different cases of Profit and Loss ; (2) Partnership.

10. The rain which fell during a certain shower on the roof of a rectangular building, 135 feet long and 99 feet wide, filled a cistern 8 feet long,6 feet deep and 3 feet broad ; how many (long) tons of water fell during that shower on an adjoining field of 6 acres ?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 15th JULY, 1873.

No. 5.

ARITHMETIC.

TIME—THREE HOURS

1. Define a fraction and fully explain the terms numerator and denominator.

   Simplify $\frac{\frac{5}{9} \text{ of } \frac{3}{7}}{6\frac{1}{5} - 5\frac{4}{15}} \div \frac{\frac{2}{3} \times \frac{11}{12}}{\frac{1}{18} \times 5\frac{1}{2}}$.

2. Bought $\frac{2}{5}$ of $4\frac{1}{3}$ cords of wood for $\frac{2}{5}$ of $\frac{2}{3}$ of \$30; what were two cords worth at the same rate?

3. Show how to convert pure circulating decimals and mixed circulating decimals to vulgar fractions.

   Find the sum of $\cdot 4\acute{7}\acute{8}$, $\cdot \acute{3}2\acute{1}$, $\cdot 3\dot{2}$, $\cdot 7\acute{8}56\dot{4}$, $\cdot \acute{5}$, and $\cdot \acute{4}32\acute{6}$, and the product of $3 \cdot 45\acute{6}$ by $\cdot 42\acute{5}$.

4. How many feet of lumber will be required to inclose a building $60\frac{1}{2}$ feet long, $40\frac{1}{4}$ feet wide, 22 feet high, and each side of the roof $24\frac{1}{6}$ feet, allowing $523\frac{1}{4}$ feet for the gables, and making no deductions for doors and windows?

5. Find the difference between the true and the bank discount of \$2500, payable in 90 days, at 7 per cent.

6. Find cost of plastering the walls of a room $30\frac{1}{2}$ feet long, $18\frac{1}{2}$ feet wide, 12 feet high, at 18 cents per square yard (no allowance for openings); find also the cost of carpeting such a room with carpet 27 inches wide, and costing \$1.80 per yard.

7. Ten per cent. of an army was slain on the field of battle, and 5 per cent. of the remainder were mortally wounded: the difference between the killed and mortally wounded was 1100; how many men went into battle?

8. Having received a stock dividend of 8 per cent., I find I am now the owner of 297 shares; how many shares did I own at first?

9. Given, that pure water is composed of oxygen and hydrogen in the proportion, by weight of 15 to 2, find the weight of each in a cubic foot of water.

10. How many railway shares (\$100 each) at 40 % discount, must be sold in order that the proceeds invested in bank stock, which is 4 % below par, and pays a dividend of 7 %, may yield an income of \$1680.

11. A railway company pays \$24.75 per acre for a portion of road 100 miles long and $94\frac{1}{2}$ feet wide, find the whole amount paid.

12. An Insurance Company took a risk at $2\frac{1}{4}$ %, and reinsured $\frac{3}{5}$ of the risk at 2 %; the premium received exceeded the premium paid by \$42; find the amount of the risk.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 14th JULY, 1873.

No. 6.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS AND A HALF.

1. You are placed in charge of a country School, in which an assistant with a third class certificate is employed. How would you divide the work ? Give reasons.
2. Discuss the advantages and disadvantages of simultaneous answering, and state what means may be employed to rectify the latter.
3. What are the objects to be aimed at in teaching history in Schools ? Describe your method of teaching it.
4. What was Pestalozzi's theory of education ?
5. State the arguments for and against giving prizes.
6. Discuss the comparative advantages of relative and absolute marking.
7. Describe your method of dealing with pupils who have formed the habit of coming late.
8. Sketch the system of instruction pursued in the German Kindergärten.
9. What penalty is incurred under the regulations by pupils who absent themselves from the regular quarterly examinations ?
10. Summarize the regulations with regard to adequate School accommodation.
11. What are the powers of trustees in regard to the purchase of School sites from owners unwilling to sell ?
12. What persons are excluded by law from the office of School trustee ?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 15th JULY, 1873.

No. 7.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS AND A HALF.

1. What is education? What portion of our education is mainly given in, and what portion mainly outside of the School-room?

2. Discuss the importance to a teacher of habits of

   (*a*). Order.
   (*b*). Self-control.
   (*c*). Cheerfulness.

3. Would you teach letters or words first to children just beginning to attend School? Give reasons for the plan you would adopt? What is meant by the *phonic* method of teaching reading?

4. In teaching grammar would you begin with the relations of words, the meanings of words, or the definitions of the text book? Give reasons for your answer.

5. State with reasons what in your opinion is the proper place in the study of a subject for the introduction of a systematic exposition of it.

6. You are placed in charge of a School of 40 pupils, who are at all stages in arithmetic up to proportion. You find that you can give only one hour and a half per diem to the subject. How many classes will you form, what time will you give to each class, and how will you employ the time with each class?

7. What are the duties of a public school teacher, as laid down by law?

8. What is the theory of the law in regard to the relation of a teacher to his pupils while they are under his charge?

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2nd CLASS PROVINCIAL AND 3rd CLASS COUNTY CERTIFICATES.

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No. 8.

READING, DICTATION AND WRITING.

(This Paper is not to be seen by the Candidates.)

Fifth Book; Ancient and Modern Farming, page 467.
From "This necessarily attracting attention," to "comparatively peculiar system." *(For Dictation and Writing.)*

Fifth Book; Farewell Address to the Senate, page 323.
From "In the course," to "any of its members." *(For Reading.)*

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 14th JULY, 1873.

No. 9 (*a*).

HISTORY.

TIME—TWO HOURS AND A HALF.

1. Give an account of the United Empire Loyalists.

2. When, and under what circumstances, did the Union of the Provinces of Upper and Lower Canada take place? Mention some important features introduced into the constitution of United Canada.

3. Sketch the history of Canada under the Administration of Lord Elgin.

4. By whom was the title, Prince of Wales, first borne? What historical association connected with the motto, *Ich dien?*

5. Who was the first English Sovereign of the House of Lancaster? And how did he come to the possession of the throne?

6. "The great social feature of the period was the abolition of Villenage." (*Text-book*). What was Villenage? At what period in English history was it finally extinguished? Notice the causes which gradually led to its extinction.

7. Give an account of the impeachment of the Earl of Strafford.

8. Give some account of the manner in which the Restoration of Charles II. was brought about.

9. Give an account of the massacre of Glencoe.

10. Notice briefly, important historical circumstances connected with the names, Leuctra, Arbela, Lutzen, Navarino.

Note. In estimating the value of the answers to the above questions, the Examiners will take into account the style of the composition, as well as the historical knowledge displayed.

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3rd CLASS COUNTY CERTIFICATES.

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No. 9 (*b*).

HISTORY.

TIME—TWO HOURS AND A HALF.

1. Under what circumstances did the first Norman King obtain possession of the English Throne ?

2. What was the immediate cause of the contention between Thomas à Beckett and Henry II. ? Narrate briefl the progress of the quarrel, and its issue.

3. Give some account of the impeachment of the Earl of Strafford in the reign of Charles I.

4. Give a brief account of the manner in which the Restoration of Charles II. was brought about.

5. In what circumstances did William of Orange call the Assembly known as the Convention ?

6. In the Declaration of Rights drawn up by the Convention, what was declared ?

7. When was America discovered ? Who discovered Newfoundland? Who discovered Canada ? Name the European Sovereigns who commissioned the expeditions, by which America, Newfoundland, and Canada respectively were discovered.

8. Describe the treatment which Cartier received from the Indians at Hochelaga.

9. Sketch the career of Champlain.

10. What led to the Battle of Marathon ? By whom were the ancient Babylonian and Persian Empires respectively overthrown ?

NOTE.—In estimating the value of the answers to the above questions, he Examiners will take into account the style of the compositon, as well as the historical knowledge displayed.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 14th JULY, 1873.

No. 10.

GEOGRAPHY.

TIME—TWO HOURS.

1. Write down in order the names of the principal rivers flowing into the Northern Pacific.
2. State accurately the position of Gondar, Auckland, Sofala, Macao, Lake Tchad, Norfolk Island Mysore, Omaun, Jassy, the Riesen Gebirge, Granada, Para.
3. From what parts of the world are tin, cloves, cinnamon, sandalwood, cocoa, sulphur, diamonds and allspice chiefly obtained?
4. For what manufactures are Sheffield, Lowell, Belfast, Valenciennes and Geneva noted?
5. Trace the course of the Ganges, Seine and Hudson, naming the chief towns on their banks or in their basins, and the mountains, hills, or elevated grounds which form the limits of the territories which they drain.
6. Define the geographical position and political relations of Barbadoes, Gibraltar, Gottland, Andorra, Heligoland, Dominica, Goa.
7. If a traveller were to go in a straight line from Bombay to Pekin, what countries, mountains and rivers would he traverse?
8. What are the natural divisions of Hindostan? What the political?
9. Draw a map of Turkey in Asia, marking the position of Smyrna, Trebizond, Aleppo, Bagdad, Damascus and Jerusalem, and the course of the Tigris, Euphrates and Jordan.
10. Why will the Canadian Pacific Railroad, running from Montreal to Victoria, be shorter than the American route from New York to San Francisco?
11. A vessel leaves New York at noon, May 17th, and reaches London at six a. m., on May 27th. How many hours has she been at sea?

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3rd CLASS COUNTY CERTIFICATES.

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No. 11.

GEOGRAPHY.

TIME—TWO HOURS.

1. Explain the terms Tropics, Volcano, Estuary, Sound, Isothermal Lines.
2. Name the States bounded or intersected by the Andes and the Rhine.
3. Name in order the chief ports on the Baltic Sea.
4. Name and locate the principal European and American volcanoes.
5. Describe the most expeditious travelled route from Toronto to Lima.
6. Where and what are: Trinidad, Utrecht, Ben Nevis, Rugen, Popocatapetl, Fife Ness, Trieste?
7. What are the physical characteristics of Florida, Hungary and Corsica?
8. Define the geographical position and political relations of Alderney, Minorca, Corfu, Heidelberg, Kiel, Martinique, Balize.
9. Draw a map of Great Britain, marking the position of London, Liverpool, Manchester, Edinburgh and Glasgow, and showing the courses of the Thames, Humber and Severn.

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COMMENCING 14th JULY, 1873.

No. 12.

MUSIC AND DRAWING.

TIME—ONE HOUR AND A HALF.

Music.

1. Explain the construction of the Diatonic scale—major and minor Chromatic scale.

2. Tell what is meant by the signature of a scale, and explain why that signature ever requires to be changed.

3. What is the signature of the scale of A, and why?

4. What notes of a scale constitute its common chord, and what difference exists in a major and a minor chord? Illustrate by the chords of C major and C minor.

5. What is meant by common time?
   " " $(\frac{3}{4})$ three-fourths?

6. On what parts of the bar does the accent fall in common time?
   " " " in triple time?

7. Write three examples of a bar of common and three of triple time, varying their construction.

Linear Drawing.

1. Define trapezium, cycloid, parabola.

2. Explain how you would draw—
   (*a*) An ellipse.
   (*b*) A triangle of which the length of the base and the magnitude of the base angles were given.
   (*c*) A crescent.

3. In a church 45 feet long inside, the pulpit is to be placed 9 ft. from the end, exactly on the medial line. How could you ascertain the point in a plan without actual measurement?

4. Explain by diagram how you would describe a spiral of any given number of revolutions.

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COMMENCING 14th JULY, 1873.

No. 13.

EUCLID.

TIME—TWO HOURS AND A HALF.

NOTE.—Candidates who take only Book I., will confine themselves to the first eight questions; those who take Books I. and II., will omit the first two questions.

1. If two angles of a triangle be equal to one another, the sides also which subtend, or are opposite to, the equal angles, shall be equal to one another.

2. If one side of a triangle be produced, the exterior angle shall be greater than either of the interior opposite angles.

3. The opposite side, and angles of a parallelogram are equal to one another.

4. The complements of the parallelograms, which are about the diameter of any parallelogram, are equal to one another.

5. To describe a square on a given straight line.

6. Let A B C D be a quadrilateral figure whose opposite angles A B C and A D C are right angles. Prove that, if A B be equal to A D, C B and C D shall also be equal to one another.

7. If A B C D be a quadrilateral figure, having the side A B parallel to the side C D, the straight line which joins the middle points of A B and D C shall divide the quadrilateral into two equal parts.

8. The straight line, which joints the middle points of two sides of a triangle, is parallel to the base.

9. If a straight line be divided into any two parts, the square on the whole line is equal to the squares on the two parts, together with twice the rectangle contained by the parts.

10. In an obtuse angled triangle, is the sum of the squares of the sides containing the obtuse angle greater or less than the square of the side opposite to the obtuse angle? And, by how much? Prove the proposition.

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No. 14.

NATURAL PHILOSOPHY.

TIME—TWO HOURS AND THREE-QUARTERS.

1 (*a*). The mechanical advantage of a machine, on which a weight W is sustained by a power P, being understood to be the ratio $\frac{W}{P}$; and the machine being said to gain, or to lose, advantage, according as this ratio is greater or less than unity; describe two sorts of straight levers, the one of which always gains, and the other always loses, advantage. (*b*.) When mechanical advantage is lost, does the machine serve any good purpose? If so, what? Illustrate by a familiar example.

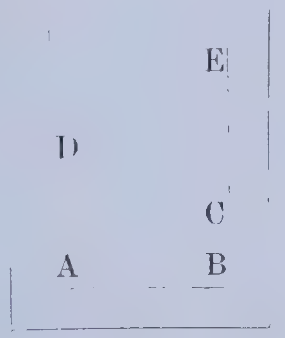
2. When a door is turned round its hinges by a force applied horizontally at the handle, what is the resistance which the force so applied overcomes?—If the weight of the door be increased, is the force required to turn the door increased? If so, how does the increase of a *vertical* force render necessary the increase of of a *horizontal* force?

3. "A number of pullies are attached to the same block, which supports a weight, and the same string passes round all the pullies."—Draw a diagram representing such a system, with three pullies in the block; and state (without proof) the mechanical advantage.

4. Enunciate the principle of Virtual Velocities; and show how it holds good in the system of pullies referred to in the previous question.

5. A hollow cone filled with water, is placed with its base on a horizontal table. The weight of the water being 1,000 oz.; and the weight of the vessel, when empty, 100 oz.; enquire whether *the pressure of the water on the base of the vessel* is greater or less than *the pressure of the vessel, with the water therein contained, on the table?* And, in what proportion?—(It may be taken for granted that the volume of a cone is one-third of that of the circumscribed cylinder.)

6. Two liquids of different densities are placed in the opposite branches of an inverted bent tube; the one liquid occupying the space E C, in the right hand branch; and the other rising to D in the left hand branch. If A B be horizontal, and A D and B E vertical; and if B C = 2 inches, and A D = 3½ inches, and B E = 7 inches; find the ratio between the specific gravities of the liquids.



7. Draw a diagram exhibiting the essential parts of the Air-pump; and explain the action of the machine.

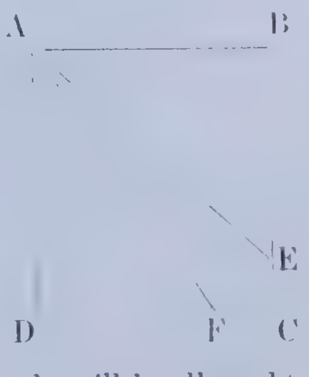
8. Describe the Common Hydrometer; pointing out its use, and the principle on which it is founded.

9. What is Friction?

Inquire whether friction acts to the advantage or to the disadvantage of the Power, *first,* when the Power is on the point of raising the Weight; and *secondly,* when the Power is just preventing the Weight from descending.

What is the co-efficient of friction?

10. A B C D is a square, whose side is $4\sqrt{2}$ feet in length; and C E = C F. If the resultant of two forces, which act on a particle at A, and are represented in magnitude and direction by the lines A E, A F, respectively, be represented by a line 14 feet in length, prove that each of the lines C E, C F, is equal to a fourth part of the side of the square.



NOTE.—The first nine questions will be considered a full paper. Additional marks will be allowed to candidates who answer the tenth question.

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COMMENCING 14th JULY, 1873.

No. 15.

BOOK-KEEPING.

TIME—ONE HOUR.

1. Explain the distinction between Double and Single Entry.

2. Define the Day Book, and explain your method of opening, conducting and closing it, both by Double and Single Entry.

3. Explain the object of the journal in Single and Double Entry.

4. What is Journalizing? Give rules for it. On what principles is it based?

5. What is the peculiarity of the Cash Book, Bank Book, Expense and Private Accounts?

6. Rule paper for Cash Book, Bank Book, Journal and Ledger; make the correct entries of the following transactions; then balance Ledger and exhibit on balance sheet the result of your business. No index to Ledger need be given.

   1873. June 1st.—In hand, merchandise per inventory, $2000; in Bank of Montreal, $800; Cash in hand, $100; I owe James King $100; John Sim owes me $100. June 2nd, sold John Sim mdse., $1000, receiving in payment his note for $500 and cash $500. June 3rd, bought of John King, mdse., $600, giving in payment my note at four months, $200, cash, $200, cheque on Bank of Montreal, $200. June 4th, deposited in Bank Montreal, $200; paid store rent $100; Cash sales this day, $100. June 5th, Montreal Bank discounts John Sim's note, cash received, $490, discount allowed, $10. June 6th, lost a ten dollar bill. June 7th, Cash sales this day, $200. June 8th, paid James King by cheque on Montreal Bank, $100. June 9th, discounted my note, paying cash, $195, discount allowed, $5. June 30th, mdse on hand per inventory, $1500.

7. James King is charged for 15 articles and credited for 12 during June; render his account.

8. Write an order for Stationery to Adam Miller, Toronto; goods to be delivered to self at Hamilton, per Steamer *Ida*.

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No. 16.

ALGEBRA.

TIME—TWO HOURS AND A HALF.

1. Show that $\frac{x+y}{y}-\frac{2x}{x+y}+\frac{x^2y-x^3}{x^2y-y^3}$, when simplified, can be put in the form, $\frac{y}{x+y}$.

2. Prove, that, if c be a common measure of m and n, it will also be a common measure of the difference of any multiples of m and n.

3. Find the Highest Common measure of the expressions,
$4x\,_3-5x^2-75x$, and, $3x^3-15x^2+25x-125$.

4. Solve the equation, $3x-\frac{1}{3}\ (x-2)-[4x-\frac{1}{2}\ \{4-2\ (2-3x)\}]+\frac{x}{2}=\frac{17}{6}$.

5. Solve the equation,

$$\frac{5-\frac{x}{5}}{3-x}+\frac{3-\frac{x}{3}}{5-x}+\frac{6+9x-\frac{8x^2}{15}}{15-8x+x^2}=0.$$

6. Solve the equation, $\left(\frac{1}{x}+\frac{1}{a}\right)\left(\frac{1}{x}-\frac{1}{a}\right)-\left(\frac{1}{x}+\frac{1}{b}\right)\left(\frac{1}{x}-\frac{1}{b}\right)=\frac{a+b}{a\,b\,x}$.

7. Solve the simultaneous equations,
$2x+3y=14xy,\quad \frac{1}{x}+\frac{2}{y}=10.$

8. A traveller P sets out to walk from A to B, proceeding at the rate of 3 miles an hour ; and, 32 minutes afterwards, another traveller Q sets out to walk from B to A, proceeding at a uniform rate. They meet half way betwixt A and B. P then quickens his pace by one mile an hour ; and Q slackens his one mile an hour. Q reaches A at the same time that reaches B. Find the distance between A and B.

9. Find a fraction, which, when a certain quantity is added to its numerator and subtracted from its denominator, becomes $\frac{4}{5}$; but, when the same quantity is added to its denominator, and subtracted from its numerator, becomes $\frac{1}{2}$.

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No. 17.

CHEMISTRY, BOTANY AND PHYSIOLOGY.

TIME—THREE HOURS.

1. Describe an experiment to prove that when a candle burns the materials are not annihilated.

2. Describe cases in which chemical actions occur. Distinguish between a chemical element and a compound.

3. Give the properties and a mode of preparation of oxygen gas.

4. 65.2 parts by weight of zinc in decomposing water yield 2 parts by weight of hydrogen. How much zinc must be employed to obtain 50 lbs of hydrogen?

5. Fully explain the following equation representing the results of the action of potassium on water.

$$\left.\begin{matrix}H\\ H\end{matrix}\right\} O + K = \left.\begin{matrix}K\\ H\end{matrix}\right\} O + H.$$

6. How many degrees C and R correspond to $+42^\circ$ and -32° F? How many degrees F and R correspond to $+78^\circ$ and -172° C?

7. What reasons have we for believing that the air is a mechanical mixture and not a chemical combination of nitrogen and oxygen?

8. Describe an apparatus for estimating the quantity of carbonic acid gas contained in the air.

9. Describe fully (1) the plant in Vegetation: (2) the plant in Reproduction.

10. Describe Fibrous roots, Fleshy roots, and different kinds of Tap root.

11. Describe the structure and veining of leaves.

12. Name the organs of respiration. Describe them and give their functions.

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No. 18.

EUCLID.

TIME—THREE HOURS.

1. The angle in a semicircle is a right angle.

2. A segment of a circle being given, describe the circle of which it is a segment.

3. Give Euclid's definition of proportion ; and prove, by taking equimultiples according to the definition, that 2, 3, 9, 13, are not proportionals.

4. Similar triangles are to one another in the duplicate ratio of their homologous sides.

5. To find a mean proportional between two given straight lines.

6. Through C, the vertex of a triangle A C B, which has the sides A C and C B equal to one another, a line C D is drawn parallel to A B ; and straight lines, A D, D B, are drawn from A and B to any point D in C D. Prove that the angle A C D is greater than the angle A D B.

7. A B C D is a quadrilateral figure inscribed in a circle. From A and B, perpendiculars A E, B F, are let fall on C D (produced if necessary); and from C and D, perpendiculars C G, D H, are let fall on B A (produced if necessary). Prove that the rectrangles A E, B F and C G, D H are equal to one another.

8. A B C D is a quadrilateral figure inscribed in a circle. The straight line D E drawn through D parallel to A B, cuts the side B C in E ; and the straight line A E produced meets D C produced in F. Prove, that if the rectangle B A, A D be equal to the rectangle E C, C F, the triangle A D F shall be equal to the quadrilateral A B C D.

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No. 19.

GEOGRAPHY.

TIME—TWO HOURS.

1. State the theory implied in the expression "crust of the earth." What proofs of the theory occur to you?

2. Classify the sedimentary rocks according to their age. "Staffa is remarkable for its basaltic columns." What is basalt?

3. What are the prevailing trends of the rivers, mountain ranges, and coast lines in North and South America.

4. In going from New York to San Francisco by rail, a traveller will pass through several distinct and well defined natural regions. Give the distinguishing features of each.

5. Enumerate the principal areas of volcanic activity in recent times.

6. In what respects does the climate of the summit of Mont Blanc differ from that of Spitzbergen?

7. "Venus is a morning star for about 290 days, and an evening star for nearly the same length of time, though she performs her whole revolution round the sun in $224\frac{2}{3}$ days." Explain.

8. Explain the phenomena of the tides.

9. Name the thirteen original states of the American Union, and give their capitals.

10. Describe the course of the Grand River, Susquehanna and Elbe, enumerating the principal towns and cities on the banks of each.

11. Enumerate the possessions of France in the different parts of the world.

12. For what are Tokay, Leipzic, Xeres, and Lutzen noted, and where they are situated?

13. Draw a map of the Mediterranean Sea, marking the names of the countries on its shores, the courses of the principal rivers that flow into it, and the positions of all the cities containing 100,000 or more inhabitants, that lie within 100 miles of its waters. Indicate by a double dotted line the boundaries of the Roman Empire at the period of its greatest extent.

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No. 20.

PHYSICS.

TIME—TWO HOURS.

1. It is required to find the altitude of a place by boiling water—explain how this is possible. If only salt water is at hand, how can this be used for the purpose.

2. What is meant by the *specific heat* of bodies?
If two oz. of platinum, after being heated in a furnace, be put into 26 oz. of water at 0° C., and the temperature of the whole becomes 3°, what was the temperature of the platinum, its specific heat being ·0325?

3. Of three thermometers, A. B and C, A's bulb is uncovered, B's is coated with lamp-black, and C's with polished silver; compare the temperatures they will indicate (1) when they have all been some time in the same room, (2) are then exposed for a short time in the open air on a clear cold night, and (3) are then brought into the same room again. Give the reasons for the differences of their indications.

4. Define the magnetic meridian of a place.
If a well-constructed dip needle be placed with its pivot in the magnetic meridian, what position will it assume? Explain the reason of this.

5. I wish to express numerically the relative strength of two bar magnets. You are required to describe some accurate means of doing so.

6. Describe the unit jar and its uses.
The knob of a Leyden jar which has 36 square inches of coated surface, and is charged with a given quantity of Electricity, is made to touch the knob of another jar having only 6 square inches of coated surface, both outer coatings being in contact with the ground. Compare the charges they will severally retain when separated, both as to quantity and striking distance.

7. Describe accurately a cell of any battery with which you are best acquainted, and state particularly the chemical actions which occur within the cell when its current circulates.

8. State the general principles on which the Electrotype process depends. You are required to *electroplate* a small piece of polished steel; state fully how you would proceed.

9. Give a short account of Spectrum Analysis.

10. Trace a pencil of *three* rays through the common astronomical telescope.
Why did Newton despair of improving *refracting* telescopes?

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1st CLASS PROVINCIAL CERTIFICATES.

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No. 21.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. Among the candidates who presented themselves at an examination for first class certificates, A obtained 65 per cent. of the aggregate of marks, and failed to pass; B obtained 80 per cent. of the aggregate, and thus obtained 120 marks more than the required minimum for pass. If A had made 240 marks more he would have just reached the minimum for pass. Find the aggregate of marks and the per centage required to pass.

2. A person in London owes another in St. Petersburg a debt of 460 roubles, which must be remitted through Paris; he pays the requisite sum to his broker at a time when the exchange between London and Paris is 23 francs per £1, and between Paris and St. Petersburg 2 francs per rouble: the remittance is delayed until the rates of exchange are 24 francs per £1 between London and Paris, and $1\frac{1}{2}$ francs per rouble between Paris and St. Petersburg: what did the broker gain or lose by the transaction?

3. Prove the rule for finding a residue of figures in the extraction of the square root. Extract the square root of 7 to 10 decimal places, and deduce $\frac{\sqrt{7}+1}{\sqrt{7}-1}$, $\sqrt{8+2\sqrt{7}}$.

4. A person starts with a capital which produces him 4 % per annum compound interest; he spends yearly a sum equal to twice the original interest on his capital. Find in how many years he will be ruined, having given log. 2 = ·3010300, log. 13 = 1·1139434.

5. A man holds three notes, the first for $1000, due April 1st; the second $1600, due July 1st; the third, $1200, due September 1st: he has them exchanged for two others, one of which is for $2000, payable May 1st: find when the other note matures.

6. If the cost of digging a trench varies as the product of the depth to which it is sunk and the quantity of earth thrown out, find the cost of digging a trench 270 feet long, 6 feet broad, and 12 feet deep, having given that a trench 4 feet broad and 9 feet deep costs 45 cents for each yard in length.

7. An insurance company issued a policy of insurance covering 80 % of the estimated value of a ship and cargo, at $4\frac{1}{2}$ %, and immediately re-insured 50 % of the risk in another company at $3\frac{1}{2}$ %. During the voyage the ship was wrecked, and the second company lost $900 more than the original insurer; what did the owners lose?

8. The expense of constructing a railway is $10,000,000, of which 40 % is borrowed on mortgage at 6 %, and the remainder is held in shares: what must be the average weekly receipts so as to pay the shareholders 5 % the working expenses being 65 % of the gross receipts?

9. Three persons, A, B and C, form a partnership, contributing to the common capital $3500, $2200, and $2500 respectively; at settlement, A.'s gain is $1120, B.'s $[illegible]80, and C.'s $1200: given that B.'s stock was in the business two months longer than A.'s, find the time the money of each continued in trade.

10. If gold can be beaten out so thin that a grain will form a leaf of 56 square inches, how many square inches of such gold-leaf will be required to make a cubic inch, the weight of a cubic foot of gold being supposed to be 1200 lbs. Avoirdupois?

11. The sides of a triangle, A B C, are 25, 30 and 35 feet respectively; on these sides external squares are described, A C D E, A B K H, B C G F: find the aggregate area of the squares described on the lines G H, K D, E F.

12. The sides of a rectangle have to each other the ratio of 1 : $\sqrt{3}$; and a perpendicular is let fall from one of the angles upon the diagonal: find in what ratio the diagonal is divided.

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No. 22.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME THREE HOURS.

My celestial patroness
* * * * * inspires
Easy my unpremeditated verse:
Since *first* this subject for heroic song
Pleased me long choosing, and beginning late;
Not sedulous by nature *to indite*
Wars, hitherto the only argument
Heroic deemed, chief *mastery to dissect*
With long and tedious havoc fabled knights
In battles feigned; the better fortitude
Of patience and heroic martyrdom
Unsung; *or to describe* races and games
Or tilting furniture, emblazoned shields,
Impresses quaint, caparisons and steeds;
Bases and tinsel trappings, gorgeous knights
At joust or tournament; *then* marshalled feast
Served up in hall with sewers and seneschals;
The *skill* of artifice or office mean,
Not that which justly gives heroic name
To persons or to poem. *Me* of these
Nor skilled nor studious, higher argument
Remains, sufficient of itself to raise
That name, unless an age too late, or cold
Climate, or years, damp my intended wing
Depressed, and *much* they may, if all be mine,
Not hers who brings it nightly to my ear.
Milton: *Par. Lost, Bk. IX.*

1. Give the full syntactical parsing of the thirteen italicized words.

2. Divide the extract into propositions, stating their kind and connection, and give a complete analysis of each proposition.

3. Parse the italicized words in the following:
“*To speak* the truth, I have never been in such distress as now.”
“The king so *far* from raising the question attempted to prevent the queen from raising it.
“The performance of the pupils is wonderfully good *considering* that they have only one teacher.”

4. Correct or justify:
“The pupils who have finished the exercise stand up.”
“I intended to have written last week.”
“Do for any sake be quiet.”
“He got married to a widow.”
“About one hundred feet of the dam has been swept away.”

5. Point out the figures in

“O wild West Wind, thou breath of Autumn's being,
Thou from whose unseen presence the leaves dead
Are driven like ghosts from an enchanter fleeing,
Yellow, and black, and pale, and hectic red,
Pestilence-stricken multitudes!”

6. “Substantives signifying the same thing agree in case.” Point out the defects of this rule for apposition, and define *apposition*.

7. Name the inflected parts of speech, state the inflections to which they are subject and give an example of every inflectional form in the language.
Give all the inflectional forms of *abbot*, *me*, *was*.
Are *fatherly*, *happier*, and *acknowledgment* inflectional forms?
Explain the forms *his* and *whose*.

8. When and under what circumstances did the principal elements which enter into the composition of the English language severally take their places in it?

9. Give the derivation of: Muslin, currant, hymeneal, bursar, coercion, rill, priest, deed, bishopric, urbanity, universe, here, inoculate, religion, gentry, chestnut, vulgate, preposterous, rival, romance, health, legend, fancy: tracing the history of the meaning wherever you can.

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No. 23

SCHOOL LAW.

TIME - ONE HOUR AND-A-HALF.

1. How many and what kinds of schools may be established by trustees-
   (*a*) In rural sections?
   (*b*) In cities, towns and villages?

2. Sketch the provisions of the law with regard to compulsory education, and state what connection (if any) exists between it and free schools.

3. Summarize the provisions of the law and the regulations with reference to religious exercises and instruction, and explain how they may be carried out.

4. What appeals may be made to the county inspector? Mention restrictions on these appeals (if any).

5. Summarize the duties and powers of trustees in rural sections with respect to—
   (*a*) Raising or otherwise obtaining school moneys. Distinguish the objects in each case.
   (*b*) Employment of teachers.
   (*c*) The use of text books.

6. Sketch the provisions of the law with regard to the fees which may be charged in some schools. State the objects, and mention the schools (if any) in which fees cannot be charged.

7. Define "School fund." To what purpose it must be applied? State exceptions, (if any)?

8. What are the regulations with regard to presents to teachers, and purchase and sale of stationery, books, &c., by them

9. Distinguish union from united school sections, and give examples?

10. Summarize the provisions of the law with regard to the number of trustees in the different kinds of school corporations, and the number to be elected annually in each case.

11. What are the duties of public school inspectors with regard to—
    (*a*) High Schools.
    (*b*) The apportionment of the public school fund.

12. Sketch the powers and duties of township councils with regard to the raising or otherwise providing of school moneys. Point out wherein they have (if any) discretion in the matter.

13. State the arguments for and against township school boards.

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No. 24.

BOTANY AND AGRICULTURE.

TIME—TWO HOURS.

1. Give the characters of (*a*) the classes Exogens and Endogens; (*b*) the Mint and Lily families.

2. To what family do the Cedar, Clover, Mustard and Dandelion respectively belong?

3. To what families does the following description apply?

   "Herbs, or sometimes shrubs, with a colourless, bitter or nauseous juice (often poisonous); alternate leaves; and regular flowers, with 5 (or in cultivated plants sometimes 6 or 7) mostly equal stamens and one pistil. Ovary with 2 or more cells, in fruit becoming a many-seeded berry or pod. Corolla plaited in the bud or valvate, *i.e.*, the lobes placed edge to edge."

   Explain the meaning of the terms "regular flowers," "stamens," "pistil," "ovary," "corolla," "plaited in the bud."

4. Why does a botanist consider the tuber of the potato an underground stem?

5. Give the philosophical explanation of the nature of a flower considered as to the origin and correspondences of its different parts.

6. Draw a spatulate, an obcordate, a truncate, a palmately divided and an odd-pinnate leaf.

7. Explain the constitution of a pome or apple-fruit.

8. What is the origin of the soil? Give a classification of soils based on their chemical constituents.

9. Discuss the comparative merits of under draining and surface draining.

10. What are the best soils for peas, flax and carrots?

11. Give the composition of quick lime. For what soils is it more useful than slaked lime?

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No. 25.

ALGEBRA.

TIME—THREE HOURS.

1. Investigate a method of extracting, when possible, the square root of a binomial surd, of the form $a + \sqrt{b}$. Extract the square root of $4\frac{1}{2} - \sqrt{14}$.

2. Solve the equation, $x^4 + x^3 + x^2 + x + 1 = 0$.

3. Given, $\dfrac{x+y+z}{m+n+r} = \dfrac{x+2y+3z}{m+2n+3r} = \dfrac{x+3y+4z}{m+3n+4r}$. Prove that $\dfrac{x}{m} = \dfrac{y}{n} = \dfrac{z}{r}$.

4. Given, x, y, z, in Geometrical Progression.
   y, z, 4, in Harmonical Progression.
   $\frac{1}{4}$, x, y, in Arithmetical Progression.
   Find x, y, z.

5. Let the sum of the squares of the roots of the first of the equations

$$\tfrac{1}{3}\left\{x^2 + (m+1)\,x\right\} = 1,$$
$$\tfrac{2}{3}\left\{x^2 + (m+2)\,x\right\} = 1,$$
$$\tfrac{3}{3}\left\{x^2 + (m+3)\,x\right\} = 1,$$

be A; of the second, B; and of the third, C. Find the value which m must have, in order that A, B, and C may be in geometrical progression.

6. Given, $(x + y\sqrt{-1})^5 = a + b\sqrt{-1}$; and $x^2 + y^2 = 1$. Prove that $a^2 + b^2 = 1$; x, y, a, and b being real.

7. Show that there are two, and only two, geometric real series, in each of which the third term is 2, and the seventh term $\frac{1}{8}$; and prove that the sum of one of these series, continued to any even number of terms, is always three times that of the other, continued to the same number of terms.

8. If $m + n\sqrt{-1}$ be a root of the equation, $x^3 + qx + r = 0$, show that m is a root of the equation, $8x^3 + 2qx - r = 0$; m, n, q, r, being real.

9. If $a, a_1, a_2, \ldots\ldots\ldots, a_n$, be in Arithmetical Progression; and $a, b_1, b_2, \ldots\ldots\ldots, b_n$, be in Geometrical Progression; and if r, the common difference of the former series, be equal to the common ratio of the latter, prove that $(a_1\, a\, r - a\, b_1) + (a_2\, b_1\, r - a_1\, b_2) + \ldots\ldots\ldots\ldots + (a_n b_{n-1}\, r - a_{n-1}\, b_n) = \dfrac{a\, r^2\,(r^n - 1)}{r - 1}$

10. Find a whole number which is greater by unity than n times the integral part of its square root, n being a whole number.

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No. 26.

EDUCATION.

TIME—ONE HOUR AND A-HALF.

1. "Prizes, Merit Marks, Emulation, Fear of Punishment, Shame, Ridicule, are of doubtful propriety as incentives to study." Give briefly your views on each of these incentives.

2. "The teacher should keep before him the true objects to be attained by school recitations." What are these objects?

3. Define Punishment. What rules ought to be observed in its infliction?

4. "The principal characteristics of good school management are Promptness, Steadiness, Earnestness, Geniality, Quietness." Explain.

5. Show that acquirement of every kind has two values—value as *knowledge*, and value as *discipline*.

6. In Education we should proceed from the simple to the complex. Explain and illustrate this proposition.

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No. 27.

CHEMISTRY.

TIME—TWO HOURS.

1. Describe the preparation of Oxygen from manganese dioxide.
   A gas bag has a capacity of 45 litres; how much manganese dioxide containing 70 per cent. of Mn. O_2 is required to fill it with oxygen at 15° C, and 750 mm. barometric pressure?

2. With hydrogen diffusing through a porous diaphragm under constant pressure into an atmosphere of oxygen, how many volumes of oxygen pass through the diaphragm for every two volumes of hydrogen?

3. How is ammonia gas usually prepared in the laboratory? Empress by symbols the reactions that occur. How many litres of ammonia gas of 740 mm. pressure and 15° C. temperature, are required to neutralize 100 grammes of pure sulphuric acid, and what is the weight of the salt produced?

4. Describe (giving equations) (*a*) the preparation of phosphorus from bones, (*b*) the preparation of caustic potash from potassium carbonate, (*c*) the extraction of metallic mercury from Cinnabar.

5. What are the sources of the white arsenic of commerce? How is it obtained?
   A piece of green wall-paper is supposed to contain Arsenic, how would you determine the point? A specimen of Tartar-Emetic is supposed to contain a small quantity of Arsenic, how would you ascertain whether Arsenic is present?

6. Name the principal places where Copper is obtained.
   What is the chemical constitution of its common ores, and how is it obtained from them?
   A piece of bread is supposed to contain Sulphate of Copper: how would you test the bread for this impurity?

7. What are the properties of the metal platinum? How is it prepared? Name its most important salt, and state its use in the laboratory.

8. A body yields by analysis 43·75 per cent. of nitrogen, and 50 per cent. of oxygen; what is its formula and its name?

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No. 28.

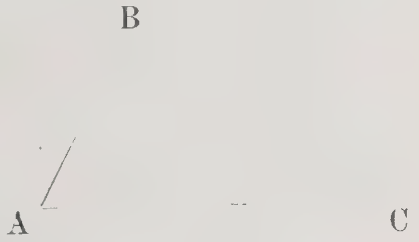
NATURAL PHILOSOPHY.

TIME—THREE HOURS.

1. A hollow cube, filled with water, is placed, with its base horizontal, under the partially exhausted receiver of an air pump. If the pressure of the rarified air on one of the faces of the cube be $1\frac{1}{25}$ times as great as that of the water on the whole interior surface of the cube, find the elasticity of the air under the receiver; the elasticity of air, which exerts a pressure of 15 lbs. on the square inch, being taken as unity; and the weight of a cubic foot of water being 1000 oz.

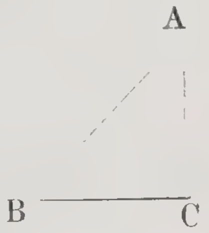
2. A particle at E, a point on a square surface A B C D, is kept at rest by four forces, which are represented in *direction* by the lines E A, E B, E C, E D, respectively; and in *magnitude* by E A, 2 E B, 3 E C, 4 E D, respectively. Prove that the point E is equally distant from one pair of the opposite sides of the square; and that its distances from the other pair of opposite sides are in the proportion of 7 to 3.

3. Let B A, B C, represent a double inclined plane; the length of B A being 25 feet, and that of B C 40 feet; A C being horizontal. A weight P. resting on A B, is balanced by a weight W, resting on B C; P and W being connected by a string, which passes over a fixed pulley at B, and the two portions of which are parallel to A B and B C. respectively. If W be 100 lbs., find P. Inquire whether the tension of the string can be found from what is given.



4. Show that the principle of vertical velocities holds good in the case of equilibrium described in the previous question.

5. (*a*) What is a uniformly accelerating force?
   (*b*) A body falls down an inclined plane A B, whose length is 10 feet, and its vertical height A C, 6 feet. What is the magnitude of the force, to whose action, in conjunction with that of the force of gravity acting vertically, the motion of the body along A B is due, the force of gravity being 32?

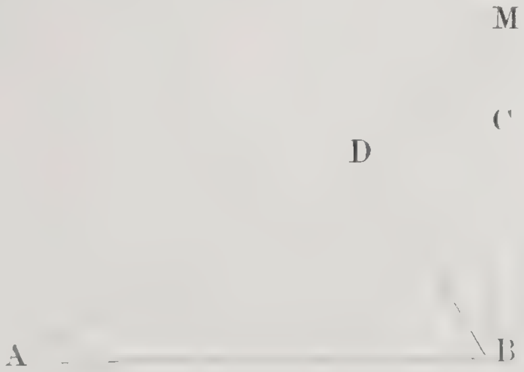


   (*c*) When the body, falling from rest at A, has reached B, what velocity has each of these forces imparted to it, in the direction of the action of the force? And through what space, in the direction of the action of the force, has each of them carried it?

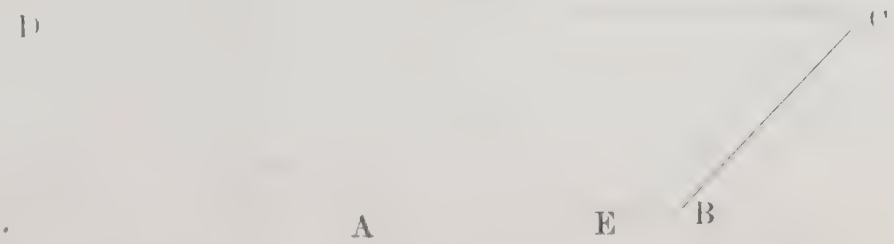
6. The line A B is horizontal; and the line A C. vertical. From A, a particle is shot vertically upwards in the direction A C, with a velocity of 320 feet in the second; and, at the same instant, another particle is projected from B in the direction B C, with a velocity of 400 feet in the second. Twelve seconds after the particles have left A and B respectively, they come into collision with one another. Find the lengths of A B and A C.

7. A cylindrical vessel, open at the mouth, is inverted; and, its axis being kept vertical, is sunk in a liquid whose specific gravity is 1·152 (sp. gr. of water = 1), till its base is coincident with the surface of the liquid. Show that the liquid will rise in the interior of the vessel to a height of $16 - \sqrt{255}$; a foot being the unit of measure; the volume of the vessel being one cubic foot; the area of the base, one square foot; the weight of a cubic foot of water, 1000 oz.; and the pressure of the atmosphere, 15 lbs. on the square inch.

8. A weight W, of 34 lbs., suspended from a string M D, which is attached to a fixed point M, rests at D on the inclined plane C A, whose base A B is 39 inches; and its vertical height C B, 26 inches. The position of D is such that B D is at right angles to C A; and the point M is in B C produced. C M being 8 inches. Prove that the tension of the string M D is 20 lbs.; and find the reaction of the plane on the weight.



9. A uniform heavy rod A B, 14 feet in length, weighing 56 lbs., and having a weight W, which is also 56 lbs., suspended from a point E in the rod, is sustained in a horizontal position by strings A D and B C, which are attached to fixed points D and C in the same horizontal line D C. The length of A D is 15 feet; of B C, 13 feet; and the perpendicular distance between the parallel lines D C and A B is 12 feet. Show that the point E, from which the weight is suspended, divides the rod in the ratio of 3 : 11.



NOTE.—The first eight questions will be considered a full paper. Additional marks will be given to candidates who solve the 9th question.

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No. 29.

ENGLISH LITERATURE AND COMPOSITION.

1. *Literature.*

TIME.—ONE HOUR AND A QUARTER.

1. Sketch the literary history of the fourteenth century.
2. Write an account of the English drama before Shakespeare.
3. State briefly Wordsworth's theory of poetry.
4. Who were the authors of The Tale of a Tub, Comus, The Dunciad, Thalaba, Vanity Fair, Utopia, Novum Organon, The Task, The Seasons.

2. *English Composition.*

TIME.—ONE HOUR.

The Candidates may choose one from among the following subjects:

1. July in Canada.
2. "A little learning is a dangerous thing."
3. Dust.
4. "Rome, Rome, thou art no more
   As thou hast been!"

☞ The presiding Inspector is directed to collect the answers to the questions on English Literature one hour and a quarter after the commencement of the examination, so that one hour may be left for Composition.

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No. 30.

BOOK-KEEPING.

TIME—ONE HOUR.

1. Classify the accounts in Book-keeping by Double Entry, and define the object of each.

2. Define the Stock account. How should it be opened and closed ?

3. State the distinction between a Bill of Purchase and an account current. What is meant by equating the former and averaging the latter ?

4. Show the distinction between a Note and a Draft.

5. The following account is found in my Ledger ; the amounts on each side are supposed to be due at their respective dates ; John Sim is to have 8 % on his money and I am to receive 10 % on mine ; Settlement is mutually demanded on the first of May, 1873. Required the balance and when due

Dr.		JOHN SIM.			Cr.
an. 15th.	To Mdse	$275.00	Feb. 1st.	By Cash on account................	$500.0
April 10th	do	650.00	May 1st.	Balance on account..................	425.0
		$925.00			$925.0

6. Rule paper for Cash Book, Bank Book, Journal and Ledger, make the correct entries of the following transactions, balance and close the Ledger, and find total gain or loss.

1873. June 1st.—In hand mdse., $4000 ; Cash, $1000 ; Bank Montreal, $500. June 1st. James Miller owes me $500. and I owe James King $400. June 2nd. Received from Montreal an invoice of cotton, amounting to $170.80, consigned by James & Co., to be sold on their account ; paid cash for freight $18.75. June 3rd. Made up on account sales, James & Co's consignment ; total sales, $217 ; charges posted, 18.75 ; my commission on sales at 5 %, $10.85 ; lost a $5 bill this day. June 4th. Consignment to Andrews & Co., Hamilton, to be sold on my account, mdse., $2000 paid cash for freight, $205.25 ; paid insurance, $10.60, goods all lost at sea ; received $2000 from Insurance Co. June 5th. Bo't of George & Co., Stratford, on my note at 6 months, mdse., $634.96. June 16th. Discounted the above note, discount allowed, $18.52 ; cash paid, $616.44 June 17th. Bo't in company with Sam. Smith, 5000 lbs. cotton at $\frac{25}{100}$ = $1250. each to share equally in the gain or loss ; for conducting the business I am to receive a commission of 5 % on all goods sold ; paid cash for my half, $625 ; Sam. Smith paid cash for his half, $625. June 18th. Sold for cash, 5000 lbs. cotton. $\frac{31}{100}$, $1550 ; paid cash for sacking. $5.25 ; my commission at 5 %. $77.50. June 29th. Cash expenses this month. $2000 ; Cash sales, $4000 ; mdse. on hand, per inventory. $1000.

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No. 31.

HISTORY.

TIME—TWO HOURS AND A-QUARTER.

1. Give an account of Lord Durham's mission to Canada, its object and results.

2. (*a*) "To unite in his person the crowns of France and of England was the greatest effort of Edward's policy." (Text Book).—What claim had Edward III. to the French crown.

   (*b*) Describe the circumstances under which Calais fell into the possession of the English. When, and how, was it regained by the French?

   (*c*) At the death of Henry V., what progress had been made in the attempt to conquer France?

   (*d*) In what reign did the dream of an English Empire in France end?

3. (*a*) "True English history begins with the reign of Henry VII." (Text Book).—On what ground is this statement made?

   (*b*) What was the ruling principle of Henry's foreign policy? Did he on any occasion depart from it?

4. Give a sketch of Cormwell's campaign in Scotland in 1650.

5. Give an account of the circumstances under which Lord William Russell, Algernon Sydney, and the Duke of Monmouth, respectively, were brought to the scaffold.

6. Give the history of the Reform Bill of 1832, and mention its leading features.

7. By what statesman was the policy of France directed during the reign of Louis XIII? What was his chief domestic object? The principal aim of his foreign policy?

8. What privilege was conceded by the Edict of Nantes? When, and by whom was the Edict issued? When and by whom, revoked?

9. Mention, in chronological order, the principal exploits of Alexander the Great

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No. 32.

ZOOLOGY AND PHYSIOLOGY.

TIME—ONE HOUR AND FIFTY MINUTES.

1. Define Class, Order, Genus, Species.
2. Give Cuvier's classification of the Animal Kingdom. Name and sketch examples of each of these great divisions.
3. Give the divisions and leading characteristics of the vertebrate animals.
4. Name the orders into which Mammalia are divided, and sketch an example of each.
5. Sketch and compare the heads of the Whalebone Whale, the Dolphin, and the Porpoise.
6. Gives the characteristics of the leading species of the Mollusca.
7. To what classes orders, and families do the following animals belong:—The Horse, Lion, Porpoise, Seal, Rat, Weasel, Ostrich, Sparrow.
8. Name the bones of the lower extremities. How many bones are there in the foot? Name them.
9. Name the circulatory organs.
10. Describe the structure and action of the heart.

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2nd AND 3rd CLASS CERTIFICATES.

COMMENCING 14th JULY, 1873.

ANSWERS TO QUESTIONS.

ALGEBRA.

3. $x-5$.
4. $x=1$.
5. $x=40$.
6. $x=\dfrac{a\,b.}{a-b.}$
7. $x=\frac{1}{2}$, $y=\frac{1}{4}$.
8. 8 Miles.
9. $\frac{7}{11}$.

ARITHMETIC, CLASS II.

1. Book-work.
2. 84000.
3. Book-work.
4. 42, 1000.
5. Book-work.
6. $88\frac{79}{174}$.
7. (1) 1400.
   (2) 7500.
   (3) 12.
   (4) 4480.
8. 1275.
9. Book-work.
10. $78\frac{4}{7}$.

ARITHMETIC, CLASS III.

1. $\frac{25}{196}$.
2. $9\frac{3}{13}$.

3. $2\cdot8\dot{9}617880706 9\dot{8}$.

   $1\cdot4710\dot{0}3\dot{7}$.
4. $7880\frac{5}{12}$.
5. $2.21.
6. $23.52, 150.46\frac{2}{3}$
7. 20000.
8. 275.
9. $882\frac{6}{17}$, $117\frac{1}{17}$.
10. 384.
11. $28,350.
12. 4000.

NATURAL PHILOSOPHY.

1. The Weight and the Power being on the same side of the fulcrum, mechanical advantage is always gained when the Weight is between the Power and the fulcrum; and always lost, when the Power is between the Weight and the fulcrum.

2. Friction at the hinges. By increasing the weight, friction is increased.

4. If the Weight be raised through a unit of space, each of the moveable pullies is raised through a unit. Therefore the Power descends two units for each moveable pully, or $2n$ unitsfor the whole, n being the number of moveable pullies.

5. Pressure on base of vessel is greater than pressure on table on the proportion of 30 to 11.

6. As 3 to 10.

9. Friction acts to the disadvantage of the Power, when the Power is just on the point of raising the Weight; and to the advantage of the Power, when it is just preventing the Weight from descending.

10. Resolve forces in the directions A D and A B. The sum of the resolved parts of the forces, in each of these directions, will be found to be represented by a line whosel ength is $4\sqrt{2}+\text{B E}$ Therefore, since the magnitude of the resultant is 14:

$$14^2=2\,(4\sqrt{2}+\text{B E})^2$$
$$\therefore \text{B E}=3\sqrt{2},$$
$$\text{and C E}=\tfrac{1}{4}\,\text{C B}.$$

PROVINCE OF ONTARIO.

Department of Public Instruction.

PUBLIC SCHOOL TEACHERS' EXAMINATION, JULY, 1873.

EXTRACTS FROM THE OFFICIAL REGULATIONS.

Time and Place of each Examination.—The half-yearly examination of candidates for Second and Third Class Certificates shall be held in each County Town in such building as may be appointed by the Inspector, who shall give at least three weeks' public notice thereof, in such manner as he shall deem expedient. The examination of candidates for First-class Certificates shall be held at the same place, [at the time mentioned below ;] but all candidates for First-class Certificates, who do not already possess Second-class Provincial Certificates, shall be required to previously pass the examination for such Second-class Certificate. No person is eligible to be a candidate for a Second-class Certificate, unless he shall have previously obtained a Third-class Certificate under the present system of examination, or a First or Second-class Certificate under the former system.

Proceedings at each Examination.—The Inspector shall preside at the opening of each examination ; and at the hour specified on the first day, and in the presence of such of his colleagues as may be there, and of the candidates, he shall break the seal of the package of examination papers received for that examination, from the Education Department. He shall also break open the seal of each additional packet of examination papers as required, in the presence of a co-examiner and of the candidates. He shall further see that at least one examiner is present during the whole time of the examination, in each room occupied by the candidates. He shall, if desirable, appoint one or more of his co-examiners (1) to preside at the examination in any of the subjects named in the programme ; (2) to read and report upon the answers as they are received.

DAYS AND HOURS OF EXAMINATION FOR SECOND AND THIRD CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, COMMENCING 14TH JULY, 1873.

DAY.	TIME.	SUBJECT.	CLASS.	NO OF PAPER.
Monday, 14th July,	2—4 30 P. M.	Natural History, botany and Agriculture. (Optional Paper.)	(2)	(1)
Tuesday, 15th "	9—12 Noon.	English Grammar and Etymology.	(2, 3)	(2, 3)
	2—5 P. M.	Arithmetic and Mensuration.	(2, 3)	(4, 5)
Wednesday, 16th "	9—11 30 A. M.	Education and School Law.	(2, 3)	(6, 7)
	11 40—12 40 P. M.	Reading and Dictation.	(2, 3)	(8)
	2—4 30 P. M.	History.	(2, 3)	(9) 9a, 9b
Thursday, 17th "	9—11 A. M.	Geography.	(2, 3)	(10, 11)
	11 10—12 40 P. M.	Music and Drawing.	(2)	(12)
	2—4 30 P. M.	Euclid.	(2)	(13)
Friday, 18th "	9—11 45 A. M.	Natural Philosophy.	(2)	(14)
	12—1 P. M.	Book-keeping.	(2)	(15)
	2 15—4 45 P. M.	Algebra.	(2)	(16)
Saturday, 19th "	9—12 Noon.	Chemistry, Botany, and Physiology.	(2)	(17)

NOTE.—Should the time allowed for Reading and Dictation be found insufficient, the Examiners will make such other special arrangements for Reading as may seem to them most convenient.

DAYS AND HOURS OF EXAMINATION FOR FIRST-CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, COMMENCING 21ST JULY, 1873.

DAY.	TIME.	SUBJECT.	NO. OF PAPER.
Monday, 21st July,	2—5 P. M.	Euclid.	(18)
Tuesday, 22nd "	9—11 A. M.	Geography.	(19)
9.10 — 1.00	~~11 10—12 10 P. M.~~	~~Book-keeping~~g. Physics	(20)
2.30 — 5.30	~~1 3—4 30 P. M.~~	Arithmetic and Mensuration.	(21)
Wednesday, 23rd "	9—12 Noon.	English Grammar and Etymology.	(22)
	1 15—2 45 P. M.	School Law.	(23)
	3—5 P. M.	Botany and Agriculture.	(24)
Thursday, 24th "	9—12 Noon.	Algebra.	(25)
	1 15—2 45 P. M.	Education.	(26)
	3—5 P. M.	Chemistry.	(27)
Friday, 25th "	9—12 Noon.	Natural Philosophy.	(28)
	1 15—3 30 P. M.	English Literature and Composition.	(29)
	3 45—4 45 P. M.	Book-keeping.	(30)
Saturday, 26th "	9—11 15 A. M.	History.	(31)
	11 25—1 15 P. M.	Zoology and Physiology.	(32)

EDUCATION OFFICE, Toronto, June, 1873.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES.—JULY, 1873.

Values assigned by the Central Committee of Examiners.

See "General Regulations respecting the Examination of Candidates," &c., Nos. 7 and 8.

(1) PAPER FOR SPECIAL CERTIFICATES IN NATURAL HISTORY, BOTANY, AND AGRICULTURE..

Question	1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of Marks for perfect answers	10	10	18	13	12	12	14	20	12	10	9	10	150

(2) (3) ENGLISH GRAMMAR

Questions		1	2	3	4	5	6	7	8	9	10	11	Total.
Number of Marks for perfect answers	(Second Class)	30	14	16	20	10	20	9	12	6	21	18	225
	(Third Class)	30	24	16	12	12	14	30	10	28	24		200

(4) ARITHMETIC.

(5) Do.

Questions		1	2	3	4	5	6	7	8	9	10			Total.
Number of Marks for perfect answers	(Second Class)	20	20	30	20	20	25	30	25	15	20			225
	(Third Class)	15	15	17	16	16	24	18	16	14	20	18	18	210

(6) (7) EDUCATION & SCHOOL LAW

Questions		1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of Marks for perfect answers...	(Second Class)	15	18	17	15	18	17	10	15	10	15	15	10	175
	(Third Class)	15	15	25	25	20	20	15	15					150

(8) READING & DICTATION — A perfectly satisfactory exercise may be reckoned 150. Additional marks to be given for Penmanship. Maximum, 75.

(9a) (9b) HISTORY — Number of Marks for perfect answers:
(Second Class)—Value of fourth question, 6; of each of the others, 16. Total value of the paper, 150.
(Third Class)—Value of each question, 15. Total value of the paper, 150.

Additional marks to be given, in connection with these papers, for Composition. Maximum, 100

(10) (11) GEOGRAPHY

Questions		1	2	3	4	5	6	7	8	9	10	11	Total.
Number of Marks for perfect answers	(Second Class)	15	18	16	10	15	16	10	10	20	10	10	150
	(Third Class)	15	20	12	12	12	21	12	21	25			150

(12) PRINCIPLES OF VOCAL MUSIC AND LINEAR DRAWING — Number of marks to be given according to the judgment of the Local Examiners; but see *Note* below.

(13) EUCLID

Questions	1	2	3	4	5	6	7	8	9	10	Total value of first eight questions.	Total value of last eight questions.
Number of Marks for correct answers.	20	20	20	20	20	25	25	25	20	20	175	175

(14) NATURAL PHILOSOPHY

Questions	1 (a)	1 (b)	2	3	4	5	6	7	8	9	10	Total value of first nine questions.
Number of Marks for correct answers	14	7	14	20	20	20	20	20	20	20	20	175

(15) BOOK-KEEPING

Questions	1	2	3	4	5	6	7	8	Total
Number of Marks for correct answers	5	10	5	5	5	50	10	10	100

(16) ALGEBRA

Questions	1	2	3	4	5	6	7	8	9	Total.
Number of Marks for correct answers..	15	20	20	20	20	20	20	20	20	175

(17) CHEMISTRY, BOTANY & PHYSIOLOGY

Questions	1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of Marks for perfect answers..	14	18	15	16	17	15	12	18	24	12	14	25	200

NOTE.—The general standing of a candidate is to be determined *irrespectively* of his proficiency in *Music* and *Drawing*, but where candidates pass a satisfactory examination in these branches, it will be noted on their certificates. The General Regulations give the Board of Examiners authority to "obtain the services of special examiners in Vocal Music and Linear Drawing, in case members of the Board are not familiar with those subjects."

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 1.

CHEMISTRY, BOTANY AND PHYSIOLOGY.

TIME—THREE HOURS.

1. Mention the different forms in which uncombined carbon occurs.

2. What are organogens? Explain the meaning of the term, and name the compound substances which form the organic constituents of plants.

3. Explain the action of cholorine when used for bleaching and disinfecting.

4. Explain the meaning of the terminations *ous* and *ic*, and of the prefixes *hypo*, *hyper* and *per* in chemical nomenclature.

5. Name the elements which enter into the composition of each of the following substances:—Common Salt, Saltpetre, White Lead, Corrosive Sublimate, Rock Crystal.

6. State generally the composition of Hard Soap, Soft Soap, Glass, Oil of Vitriol.

7. State and illustrate the law of multiple proportions.

8. Describe minutely the constitution, and explain the functions of leaves and flowers.

9. Explain the meaning of the botanical terms *fruit*, *stomata*, *endogen*, and give three examples of plants to which the last term may be properly applied.

10. Describe the position and use of the *biceps flexor cubiti*, and the deltoid muscle.

11. Enumerate the bones of the arm.

12. Describe the position and use of the Thoracic Duct, Duodenum, Pancreas, and Sympathetic Nerve.

13. Describe the action of the several parts of the heart.

14. Explain the chemical changes in the air and blood caused by breathing.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 2.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

"*Strange as it* may seem *to find* a song-writer put forward *as* an active *instrument* of union among his fellow-Hellens, it is not *the* less true that those poets whom we have briefly passed in review, *by enriching* the common *language and* by circulating from town to town either in person or in their compositions, *contributed to fan* the flame of Pan-Hellenic patriotism at a time *when there were few circumstances to co-operate* with them, and when the causes tending to perpetuate isolation seemed in the ascendant."—GROTE : *Hist. of Greece.*

1. Give the full syntactical parsing of the nineteen italicized words.

2. Divide the extract into propositions, stating their kind and connection, and give a complete analysis of each proposition.

3. Parse the italicized words in the following quotations :—

"In spite *of* such a man as Gibbon's opposition."
"They are not the same *that* they have been."
"He did it in the *geography* class."
"They are very *much* in the style of Milton's sonnets."
"That is the way *that* boys begin."

4. Correct, giving reasons, or defend the modes of expression employed in the following quotations :—

"Give us the secrets of his pagan hell,
Where ghost with ghost in sad communion dwell."
"What sort of a looking man is he?"
"Thou lovest, but ne'er knew love's sad satiety."
"One sort of feels impressed with the vastness of the building, though disgusted with the childishness of the ceremonies."

5. Write the plural of *two, hidalgo, no, chimney, colloquy, Livy, vinculum*, 3, *w, appendix, Lord Gordon, court-martial.*

6. Give the abstract nouns of the same derivation as *brief, true, common, needy, poor.*

7. Classify the pronouns, enumerating those coming under each head.

8. Give examples of the different uses of—
    (*a*) Words ending in *ing.*
    (*b*) But.

9. Give the principal parts of *hew, fly, flee, stride, rive, crow.*

10. Correct, where necessary, the spelling of —*indigenous, surpless, deliniation, dipthong, subtile, judgement, ellygyac, prophane, purliew, suffragan, indispensible, responsible.*

11. What are the Latin and Greek prefixes meaning *from, beyond, without.*

12. Make lists of the prefixes and affixes occurring in the extract for analysis, and classify them according to (*a*) Meaning, (*b*) Derivation.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th DECEMBER, 1873.

No. 3.

ENGLISH GRAMMAR, ETYMOLOGY AND SPELLING.

TIME—THREE HOURS.

"As I was reflecting upon *what* I saw, I heard a voice *in* the crowd *bemoaning* the condition of mankind, *which* is *thus* managed by the breath of Opinion, deluded by Error, *fired* by Self-Conceit, and given *up* to be trained in all the courses of Vanity, *till* Scorn or Poverty *come* upon us."—*Addison.*

1. Divide the extract into propositions, state their relations to one another, and analyse them.

2. Parse the nine italicized words in the quotation.

3. Write a sentence containing an example of every part of speech properly used.

4. Compose a complex sentence containing an example of apposition.

5. Define Conjunction, Passive Voice, Relative Pronoun, Gender.

6. Give the plurals of Appendix, Phenomenon, Cupful, Courtesy, Apology, Paradox, Genus; the feminine forms of Hunter, Sultan, Executor; the past tense and past participle of Chide, Grave, Engrave, Lay, Allay, Rive, Arrive.

7. Compose or quote a sentence containing the words *bail* and *bale* properly used, and another illustrating the different meanings of the word *crew.*

8. Correct the errors in the following sentences, giving the reasons for the changes you make:
   "I was that frightened you could have knocked me down with a feather."
   "He was more beloved, but not so much admired as Cinthio."

9. Correct when necessary the spelling of the following words:—Intracasy, Existance, Auxiliary, Saccharine, Fillial, Efervessense, Lasserate, Imbecility, Mattrass, Camelopard, Pollygimy, Fillagree.

10. Give the meanings of the prefixes and affixes occurring in the extract for analysis, and classify them according to their derivation.

11. Illustrate by examples the use of each of the prefixes denoting *negation* or *destitution*; and of each of the affixes denoting *manner*, and *rank, office,* or *dominion.*

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 4.

ARITHMETIC.

TIME—THREE HOURS.

1. When greenbacks are at a discount of $16\frac{2}{3}$, what is the price of gold?

2. State and prove the rules for converting the different kinds of decimals into vulgar fractions.

3. Water expends 10% in freezing; find the weight of water in a solid piece of ice whose dimensions are 12 ft., 8 ft., $5\frac{1}{2}$ ft. (cubic foot water weighs 1000 ounces).

4. Show that the sum of $\sqrt{0.79\dot{0}1234567\dot{9}}$ and $\sqrt{0.\dot{0}1234567\dot{9}}$ is unity.

5. Show (no formulas) how to find the (true) discount on a sum of money for a given time and rate. How much may be gained by hiring money at 5% to pay a debt of $6400, due 8 months hence, allowing the present worth of this debt to be reckoned by deducting 5% per annum discount?

7. A person having $5000 Bank Stock, sells out when it is at 40% premium; what amount of money does he receive, brokerage being $\frac{1}{8}$%?

7. If a piece of silk *cost* 80 cents a yard, at what price shall it be marked that the merchant may sell it at 10% less than the marked price, and still have 20% profit?

8. A merchant in Toronto has $4800 due him in Halifax; how much more will he realize by having a draft for this sum on Halifax and selling it at $\frac{1}{2}$% discount, than by having a draft on Toronto remitted to him, purchased in Halifax for this sum at $\frac{3}{4}$% premium?

9. A and B are partners. A's capital is to B's as 5 to 8; at the end of four months A withdraws $\frac{1}{2}$ of his capital, and B $\frac{2}{3}$ of his; at the end of the year their whole gain is $4000; how much belongs to each?

10. A commission merchant in Montreal sells for a Toronto merchant 800 bbls. flour at 6.37\frac{1}{2}$, on a commission of 3%, and buys certain goods required by his Principal, on a commission of 2% on the price paid for the goods taking his commission out of the money in hand. Find whole amount of commission.

11. A person sold two horses at $160 each, losing 20% on one and gaining 20% on the other. Did he gain or lose on the whole transaction, and how much?

12. The side, BC, of an equilateral triangle ABC, is 30 feet; lines are drawn from the angles B, C, bisecting the opposite sides, and intersecting in D. Find the area of the triangle BDC.

NOTE.—In order to pass for a 2nd Class Certificate, the candidate must obtain at least fifty per cent. of the total value of this and the Grammar paper, and at least fifty per cent. of the aggregate of the values of all the papers.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th DECEMBER, 1873.

No. 5.

ARITHMETIC.

TIME—THREE HOURS.

1. From a pound Troy are coined $46\frac{29}{40}$ sovereigns; find (in £ s. d.) the price per oz. of gold.

2. Divide $29.50 between two persons, so that one shall receive half as much again as the other.

3. Simplify $\frac{1}{5}$ of $\frac{13}{16} - \frac{1\frac{2}{3}}{13\frac{1}{3}}$ of $\frac{19}{20} + \frac{3}{14}$ of $\frac{6\frac{5}{12}}{3\frac{2}{3}}$.

4. The sum paid for 494 gallons of oil, *including* a duty on each gallon which amounts to $\frac{1}{5}$ of the cost price of a gallon, is $1719.12; find the duty on a gallon.

5. A merchant tailor bought 27 pieces of cloth, each containing $19\frac{1}{3}$ yards, at $4.31¼ a yard, and paid freight $9.62½; he sold so as to gain $381.87½. At what price per yard was the cloth sold?

6. A and B can do a work in 3 days, B and C in 6 days, A and C in 4 days. If $16 be paid for the work, what is each man worth per day?

7. Find the value of 30 cwt. 1 qr. 15 lbs. of sugar at $10.20 per cwt. (qr. = 25 lbs).

8. A person, after paying an income tax of 2 mills in the dollar, has $1531.93 left. Find his gross income.

9. Find the cost of covering a room 27 feet wide and 30 feet long, with matting 2 ft. 6 in. wide and costing $1.62½ a yard.

10. A miller has a bin 8 ft. long, $4\frac{1}{5}$ ft. wide, and $2\frac{1}{2}$ ft. deep, holding 75 bushels; how deep must he make another bin which is to be 18 ft. long and $3\frac{5}{6}$ ft. wide, so that its capacity may be 450 bushels?

11. A man, engaged in business with a capital of $10920, is making $12\frac{1}{2}$ per cent. per annum on his capital; but, on account of ill health, he quits the business, and loans his money at $7\frac{3}{4}$%. How much does he lose by the change in 2 years, $5\frac{1}{3}$ months?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 6.

EDUCATION.

TIME—ONE HOUR AND A HALF.

1. What do you understand by school organization? State the chief objects to be kept in view in organizing a school, and show how you would proceeed in classifying a new school of 50 scholars.

2. What is meant by the *natural order* of presenting a subject? Illustrate this by giving notes of an introductory lesson on
   (*a*) Physiology.
   (*b*) Fractions.
   (*c*) Grammar.

3. In administering discipline, what guiding principles should be kept in view?

4. What methods would you adopt
   (*a*) To secure order in school?
   (*b*) To prevent truancy?
   (*c*) To enlist the interest of the pupils in the credit of the school?

5. Enumerate the conditions essential to a good system of teaching arithmetic.

6. What are the chief points to be attended to by the Teacher in order that the health of the Scholars may not suffer at school?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 7.

SCHOOL LAW.

TIME—ONE HOUR.

1. What formalities are essential to the validity of an agreement between a School Board and a Teacher? and what is the consequence of their omission?

2. What classes of persons are excluded from the right of obtaining, on examination, certificates of qualification to teach?

3. What special exemptions from public duties, devolving on other Canadian subjects, do Teachers enjoy under the law of Ontario?

4. What is the law respecting the present validity of certificates granted prior to 15th February, 1871?

5. To whom does the law give the right to attend the school of a section?

6. Give the required dimensions of a Public School-house for fifty scholars; and mention the articles that would, in your opinion, be required to equip the rooms and grounds satisfactorily.

7. What are the rules and restrictions respecting the awarding of prizes to the scholars?

8. What classes of persons are eligible for election as School Trustees in cities, towns, and sections, respectively?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th DECEMBER, 1873.

No. 8.

EDUCATION AND SCHOOL LAW

TIME—TWO HOURS AND A HALF.

1. Explain what is meant by Education: distinguish Physical, Mental, and Moral education.

2. By what means may "aptness to teach" be best acquired by a young Teacher?

3. What principles should regulate the distribution of rewards and punishments in a school?

4. Describe your method of teaching (*a*) Dictation.
   (*b*) Geography.
   (*c*) Reading.

5. What is an object lesson? Give notes of an object lesson on "A Grain of Wheat."

6. What methods would you adopt
   1st. To secure order in school?
   2nd. To excite interest in study?
   3rd. To promote the moral culture of your pupils?

7. What are the duties of Public School Teachers, according to law?

8. What are the regulations with regard to
   (*a*) Absence for the purpose of visiting schools?
   (*b*) Visitors' book, and the reception of visitors?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd and 3rd CLASS CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 9.

DICTATION AND READING.

N.B.—This Paper is not to be shown to Candidates.

DICTATION.

Fifth Reader, page 261 :—" This large family of the physical sciences . . . . . light and sound."

READING.

Fifth Reader, page 269 :—" Having considered . . . . . throne of England."

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 10.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1. Trace the descent of Queen Victoria from James I.
2. Give an account of the Long Parliament.
3. Write notes on "*The Act of Supremacy*," "*The Emancipation Acts of* 1829 *and* 1834," "*The Trent affair.*"
4. What points contended for by the Chartists in 1841 have since been conceded?
5. Give some account of the South Sea Bubble.
6. Sketch Cromwell's foreign policy.
7. Give the particulars of the following battles: *Culloden, Plassey, Trafalgar, Vittoria.*
8. Write an account of the invasion of Canada in 1812.
9. What important constitutional Acts affecting Canada were passed in 1774, 1791, and 1840, respectively? Give the particulars.
10. Give an outline of Lord Elgin's administration.
11. Write notes on *Charlemagne, Tamerlane, Maria Theresa*; and give the particulars of the following battles: *Salamis, Pharsalia, Morgarten,* and *Bannockburn.*

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS COUNTY CERTIFICATES.

COMMENCING 16th DECEMBER, 1873.

No. 11.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1. Give some account of the reign of Alfred the Great.

2. Write explanatory notes on *the Great Charter, the Habeas Corpus Act, the Petition of Right.*

3. What English Sovereigns laid claim to the crown of France? State the nature of those claims.

4. Give some account of Sir Walter Raleigh.

5. Give an outline of the career of Oliver Cromwell.

6. Under what circumstances were Scotland and England united, *first,* as to their crowns, *secondly,* as to their legislatures?

7. Give some account of the events which led to the Treaty of Utrecht.

8. What is meant by the " Anti-Corn-law Movement " of 1846?

9. What circumstances induced Columbus to entertain the idea of a western route to India?

10. Describe Cartier's third visit to America.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 12.

GEOGRAPHY.

TIME—TWO HOURS.

1. Give reasons for believing the earth to be round. How do we know it to be not a *perfect* sphere?

2. Define Estuary, Glacier, Isothermal Line, Asteroid; giving examples of each.

3. State the form of government, religion and chief products of the following: Russia, Spain, Germany, Italy, Turkey, China, Australia.

4. Mention the chief results of the obliquity of the earth's axis.

5. Point out resemblances and differences in the great physical aspects of Asia and America.

6. Name the political divisions of Asia, with their capitals; describe their relative positions; and draw an outline of the Southern coast of Asia.

7. Write a description of the Dominion of Canada, with reference to (*a*) its physical aspects, (*b*) its political divisions, (*c*) its economic products.

8. State precisely the position of the following: Luxembourg, Sedan, Cawnpore, Cologne, Labuan, Delhi, Valparaiso, Melbourne, Tahiti, Lake Van, Honolulu, Straits of Fuca, Cape Rosier, Gulf of Petchelee, Cook's Straits, Island of Perim.

9. Trace the course of the Danube, naming the chief cities and towns on its banks.

10. Give in order the States of the American Union lying on the Atlantic coast, naming their capitals and principal rivers.

11. Draw a map of the district of Ontario east of Toronto, marking the Counties and County Towns.

12. Describe the mountain systems of Europe.

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3rd CLASS COUNTY CERTIFICATES.

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No. 13.

GEOGRAPHY.

TIME—TWO HOURS.

1. What is meant by the terms Arctic Circle, Longitude, Zodiac, Parallels of Latitude?
2. A ship sails from Liverpool to Canton; through what waters and by what land does she pass?
3. Where are Sheffield, Aberdeen, Rio Janeiro, Trieste, Father Point, Zealand, Bombay, Sydney, Batavia, Lyons, Smyrna, Cronstadt, Hong Kong, Aden, Cape Agulhas, Straits of Sunda, Table Bay, Gulf of Tartary?
4. Trace the course of the following rivers, naming any cities and towns on their banks: St. Lawrence, Red River, Mississippi, Rhine, Ganges, Nile.
5. What products are exported from Marseille, Aleppo, Odessa, Riga, Dantzig, Malaga, Manilla, Calcutta, Balize, Melbourne?
6. Draw an outline map of the portion of Ontario west of Toronto, shewing the counties, county towns, and chief rivers.
7. Describe the physical features of Spain.
8. Name in order the States of the American Union lying on the Atlantic, with their capitals.
9. Enumerate the Provinces of the Dominion, and give the chief cities.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

No. 14.

MUSIC AND DRAWING

TIME—ONE HOUR AND A HALF.

MUSIC.

1. What is meant by intervals, and in what scale are they of different lengths?

2. Explain the terms *Stave, Clef, Bar, Rest, Sharp, Flat.*

3. Give the signatures of the following scales: *C, E flat* and *B natural.*

4. What are the two principal kinds of time? Explain and distinguish them.

5. What is meant by the inversion of an interval?

6. Give different examples of a bar of common time, and of one of $\frac{6}{8}$ time.

7. Explain the difference between the Diatonic major and the Diatonic minor scales.

8. Write a passage in the key of C, and transpose it into that of E natural.

LINEAR DRAWING.

1. State the preliminary directions which you would give to a class beginning Linear Drawing.

2. Explain what is meant by the "*true arch principle,*" and give a drawing by way of illustration.

3. Give a drawing of a Gothic window, indicating the different steps.

4. Shew how to draw a regular hexagon, one side being given.

5. Construct an oblong equal in area to a given scalene triangle.

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No 15.

EUCLID.

TIME—TWO HOURS AND A HALF.

NOTE.—Candidates who take only Book I. will confine themselves to the first 7 questions. Those who take Books I. and II. will omit questions 3 and 4.

1. Define a *line*, a *straight line*, a *plane rectilineal angle*, a *right angle*, a *circle*, a *square*.

2. (*a*) Distinguish a *Postulate* from an *Axiom*.
   (*b*) State any two of Euclid's Postulates.
   (*c*) Complete the enunciation of Euclid's 12th Axiom : "If a straight line meet two straight lines, so as to make," &c.
   (*d*) Enunciate the Proposition in which the 12th Axiom is first made use of.

3. If two triangles have two sides of the one equal to two sides of the other, each to each, and have also the angles contained by those sides equal to one another, they shall also have their bases, or third sides, equal.

4. If two triangles have two sides of the one equal to two sides of the other, each to each, and have likewise their bases equal, the angle which is contained by the two sides of the one shall be equal to the angle which is contained by the two sides, equal to them, of the other.

5. If two triangles have two angles of the one equal to two angles of the other, each to each, and one side equal to one side, namely, either the side adjacent to the equal angles, &c. (26, I). [Take the case in which the sides supposed equal are those which are opposite to equal angles.]

6. If from D, a point in AB, the base of an isosceles triangle ABC, perpendiculars DE and DF be let fall on the equal sides AC and BC, the sum of these perpendiculars shall be equal to the perpendicular let fall from either extremity of the base on the opposite side.

7. From a given point E, it is required to draw a straight line which shall divide a given parallelogram into two equal parts.

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8. If a straight line be divided into any two parts, the rectangle contained by the whole and one of the parts is equal to the rectangle contained by the two parts, together with, &c. (3, II).

9. If a straight line be bisected and produced to any point, the square on the whole line thus produced, and the square on the part of it produced, are together, &c. (10, II).—Complete the enunciation, and give the construction necessary to prove the Proposition, with all the reasoning necessary in order that the construction may be made.

10. Let the sides, AB, BC, and CA, of a triangle ABC be 6 ft., 8 ft., and 7 ft., respectively ; and let AD be let fall perpendicular on BC. Apply any Proposition in the Second Book of Euclid to determine the length of BD.

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COMMENCING 15th DECEMBER, 1873.

No. 16.

NATURAL PHILOSOPHY.

TIME—TWO HOURS AND THREE QUARTERS.

1. Describe the wheel and axle, and state the mechanical advantage of the machine. Show that the wheel and axle, in the state of equilibrium, is identical with the lever.

2. ACB is a straight lever, whose fulcrum is C. Find the weight which, acting at A, is balanced by $15\frac{1}{2}$ oz. at B, and, acting at B, is balanced by $16\frac{16}{31}$ oz. at A.

3. A straight lever ACB, whose fulcrum is C, is kept at rest in a horizontal position by two forces, one a weight suspended from B, and the other the tension of a string which is attached to A, and runs in the direction AE. If AE be equal to AC, and the perpendicular distance of E from AB be equal to BC, find the relation between the weight suspended from B and the tension of the string EA.

4. *(a)* Let AB be the shorter arm of a syphon, and BC the longer. Suppose the instrument in operation. The end A is immersed in water, and the water is running out at the other extremity C. Explain why, when a portion of the water at B, the highest point of the syphon, falls down towards C, the water adjacent to it, on the side towards A, rushes up to fill the space that would otherwise be left vacant. Why might not the water in the limb BC all fall down towards C, and at the same time the water in the limb BA all fall down towards A?

   (b) Is there any limit to the vertical elevation of B above the surface of the fluid in which BA is immersed? If so, why?

5. Draw a diagram representing a system of pullies (3 moveable pullies in the system), in which the mechanical advantage (that is, $\frac{W}{P}$) is 8.

   (b) If W = 16 lbs., state the tension of the string passing round the middle pulley.

6. A body whose specific gravity is $1\frac{1}{2}$ (specific gravity of water being 1) hangs from a string in such a position that $\frac{1}{4}$ of a cubic foot of the body is under water, $\frac{1}{8}$ of a cubic foot being above water. Find the tension of the string. (Observe the note at the foot of the paper.)

7. *(a)* A cubical vessel, whose capacity is one cubic foot, is filled with condensed air whose elasticity is 5 times that of the free external air. Find the space which the condensed air would occupy, if allowed to expand till its elasticity was reduced to that of the free external air.

   (b) Find also the pressure of the condensed air on the interior surface of the vessel in which it is contained. (Observe the note.)

8. A hollow cubical vessel, whose capacity is one cubic foot, and which is filled with water, rests with one of its faces ABCD on a horizontal plane. What is the pressure of the water on the upper face of the vessel? What upon the base? What on each of the sides?

9. Let ABCD be a square. Bisect BC in E and CD in F. Join AE and AF. If a particle at A be acted on by two forces, represented in magnitude and direction by the lines AE and AF respectively, find the numerical value of the length of a line representing the magnitude of their resultant, the sides of the square being unity. *(The simplest solution will be to resolve all the forces in the directions AB and AD respectively, &c.)*

NOTE.—In solving the above problems, the weight of a cubic foot of water may be assumed to be 1000 oz., and the atmospheric pressure to be 15 lbs. on the square inch.

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No. 17.

BOOK-KEEPING.

TIME—ONE HOUR AND A QUARTER.

1. Explain and illustrate Book-Keeping by Double Entry and by Single Entry.

2. Name and describe the principal books used in Double Entry.

3. Describe the Cash Book, Invoice Book, Bill Book.

4. Name and describe the different kinds of Accounts.

5. Must the two sides of the Stock Account be equal, whether there be gain or loss, if the Books have been correctly kept? Explain.

6. Exhibit Ledger Accounts for the following items, and close the Accounts:

TORONTO, 1*st December*, 1863.

I have on hand balance of former account, $500. Borrowed of James Smith, $200. Paid John Williams, $531.60. Received from Thomas Moore, $200. Jan. 3: Received from John Williams, $691.50. Jan. 4: Paid James Smith, money borrowed, $200. Jan. 5: Lent Thomas Moore, $350.20. Jan. 5: Paid James Smith, $271. Jan. 6: Lent James Smith, $100. Jan. 8: Received from Thomas Moore, $250. Jan. 8: Paid James Smith, $372.20. Jan. 9: Received from John Brown for James Smith, $76.40. Jan. 10: Advanced John Williams, $155. Jan. 12: Received from Thomas Moore, $55.20. Jan. 14: Received from James Smith, $500.

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No. 18.

ALGEBRA.

TIME—TWO HOURS AND A HALF.

1. Multiply $\frac{a}{b}+\frac{b}{a}+1$ by $\frac{a}{b}+\frac{b}{a}-1$.

2. Show that $\frac{a^2-3ab+2b^2}{a-2b}-\frac{a^2-7ab+12b^2}{a-3b}$ can be reduced to the form $3b$.

3. Reduce to its lowest terms the fraction,

$$\frac{x^4+\frac{5x^2}{12}+\frac{1}{9}}{x^4-x^3+\frac{x^2}{4}-\frac{1}{9}}$$

4. (*a*) Prove that x^m-y^m is divisible by $x-y$ without remainder, when m is any positive integer.
   (*b*) Is there a remainder when $x^{100}-100$ is divided by $x-1$? If so, write it down.

5. Given $ax+by=1$,
   and $\frac{x}{a}+\frac{y}{b}=\frac{1}{ab}$.
   Find the difference between x and y.

6. Given $3-\frac{7\{3x-2(m-\frac{1}{2})\}}{8(x-1)}-\frac{\frac{9}{8}(x-4)}{3(x+1)}=0$.
   Find x in terms of m.

7. Given $\frac{x}{y}=\frac{2}{3}$. Find the value of $\frac{7x+16}{7y+24}$.

8. Given $\frac{2}{x-y}-\frac{5}{x+y}=1$,
   and $\frac{5}{x-y}-\frac{10}{x+y}=3$. Find x and y.

9. There is a number of two digits. By inverting the digits we obtain a number which is less by 8 than three times the original number; but if we increase each of the digits of the original number by unity, and invert the digits thus augmented, a number is obtained which exceeds the original number by 29. Find the number.

10. A student takes a certain number of minutes to walk from his residence to the Normal School. Were the distance $\frac{1}{8}$th of a mile greater, he would need to increase his pace (number of miles per hour) by $\frac{4}{7}$ of a mile in the hour, in order to reach the school in the same time. Find how much he would have to diminish his pace, in order still to reach the school in exactly the same time. if the distance were $\frac{3}{32}$ of a mile less than it is.

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No. 19.

COMPOSITION.

TIME—ONE HOUR AND A HALF.

Any one of the three following subjects may be chosen :

Christmas.
Canada, as a home for Emigrants.
A Canadian Winter.

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No. 20.

SPECIAL PAPER.

NATURAL HISTORY, BOTANY AND AGRICULTURE.

TIME—TWO HOURS AND A HALF.

1. State the differences in nervous organization, characterizing the different sub-kingdoms of the animal kingdom.

2. Characterize the classes Echinodermata and Myriapoda, the orders Hymenoptera, Sub-brachiati, Anoura and Cetacea.

3. In what respects do the Columbidæ differ from other Gallinaceous birds?

4. Give the class and order, and, where you can, the genus to which the following native animals belong, viz:—The Speckled Trout, Rattlesnake, Humming-bird, Raccoon, Clam, and Mosquito.

5. Describe the absorption and assimilation of food by plants, and explain the effect of these processes on the air.

6. Draw a raceme, an umbel, and a cyme.

7. Name the classes of the Vegetable Kingdom, and characterize two of them.

8. Describe the characteristics of the Crowfoot and Grass Families.

9. To what family does the following description apply?—

> "Shrubs or trees. Flowers generally polygamous or diœcious, regular. Petals often none, but the calyx sometimes petal-like. Stamens 4—12. Styles 2, united below. Fruit, a pair of keys united at the base. Leaves opposite."

10. What effect does a fall of rain have on manure applied to the soil?

11. Explain the terms Alluvial Soil, Marl, Loam.

12. Classify plants used in arts and manufactures. What soil is most suitable for the culture of flax, and what is the proper time for harvesting it?

13. What difference between the root development of barley and that of wheat?

14. Enumerate the principal elementary substances which plants contain.

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No. 21.

ALGEBRA.

TIME—TWO HOURS AND THREE QUARTERS.

1. Three clocks, A, B, and C, the first of which is gaining uniformly, and the last losing uniformly, while the second keeps correct time, are all right at noon. The rates at which they go are in geometrical progression. When C indicates midnight, A is $2\frac{1}{180}$ minutes ahead of true time. Find how many seconds A gains, and how many B loses, in the hour.

2. A hare is a certain distance ahead of a greyhound. It takes 12 leaps in m seconds, the greyhound taking 9 leaps in the same time; and 2 of the greyhound's leaps are equal to 3 of the hare's. After having taken half as many leaps as are necessary to catch the hare, the greyhound increases by one the number of leaps it takes in n seconds, the length of its leaps remaining unchanged. In consequence of this, it catches the hare t seconds sooner than it would otherwise have done. Find by how many of its own leaps the hare was ahead of the greyhound at starting.

   Ans. $\dfrac{3t\,(m+n).}{m^2}$

3. Given $(m+n)\,pq = p+q$,
   and $(p+q)\,mn = m+n$.
   Prove that, if m and n be the roots of the equation,
   $$2x^2+ax+3=0,$$
   p and q shall be the roots of the equation,
   $$3x^2+ax+2=0,$$
   a being supposed to be distinct from zero. Inquire whether the theorem holds good when a is zero.

4. Find in how many ways 12 guineas may be made up of half-guineas and half-crowns.

5. Solve the simultaneous equations:
   $$xy-2x+3y=21.$$
   $$x^2-7xy+12y^2=0.$$

6. Given $2x=a+b+c$,
   and $2bcy=b^2+c^2-a^2$.
   Prove $b^2c^2\,(1-y^2)=4x\,(x-a)\,(x-b)\,(x-c)$.

7. Given $a^2x^4+b^4y^2=2a^2bx^2y$,
   and $xy=ab$.
   Find x in terms of a and b.

8. A train leaves Hamilton for Toronto (distance $39\frac{1}{2}$ miles) at 3.35 p.m., and reaches Oakville at 4.24 p.m.; at Oakville it increases its speed one-fifteenth, and, proceeding at this augmented rate, it reaches Port Credit at 4.45 p.m., at which time also a train from Toronto arrives at Port Credit, the square root of the rate of the latter train, betwixt Toronto and Port Credit, having been less than the square root of the first-mentioned train between Hamilton and Oakville, in the proportion of 14 to 15. The train from Toronto proceeds at once to Hamilton, which place it reaches at 6 p.m., having maintained, between Port Credit and Hamilton, an average speed of $20\frac{2}{5}$ miles an hour. Find the time at which it left Toronto.

   Ans. 4. o'clock P,M.

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No. 22.

CHEMISTRY.

TIME—TWO HOURS.

1. Explain the processes by which the composition of water has been ascertained with reference to both relative weights and volumes of its constituents. Name some of the impurities of water, and state how you would detect them.

2. Explain the formation of nitric acid from nitre or sodium nitrate. Describe its properties, and state by what experiments you would illustrate them.

3. Give an account of the preparation and properties of sulphuric acid (oil of vitriol). State the action, when heated, it has with (1) potassium bi-chromate, (2) mercury, (3) potassium chlorate. What is the test for detecting it?

4. Describe and explain the preparation of chlorine and of potassium chlorate. If 1 lb. of pure black oxide of manganese be used, what quantity of chlorine can be obtained, the atomic weight of manganese being 55?

5. What substances are manufactured from common salt? Describe the processes employed.

6. The density of a gaseous hydro-carbon is 15 times that of hydrogen; the weight of the carbon is 4 times that of the hydrogen. Find the formula which represents its molecular composition.

7. Describe the process of converting pig-iron into bar-iron, and explain the chemistry of it.

8. A franc weighing 5 grains is dissolved in nitric acid, and the addition of hydrochloric acid to the solution gives a precipitate which, when washed and dried, weighs 5.97916 grains. Find the percentage of silver in the French silver coinage. Cl. = 35.5, Ag. = 108.

9. Give the composition and state the sources whence the following substances are obtained: Saltpetre, borax, black manganese oxide, potassium carbonate, sal-amoniac.

10. Define a radicle in chemistry, and explain what is meant by the quantivalence of a radicle.

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No. 23.

PHYSICS.

TIME—TWO HOURS.

1. A lump of ice is placed in a vessel of water at a temperature 20° C. ; trace the action that ensues, and point out the limit at which it ceases.

2. One pound of steam at a temperature of 100° C. is passed through 10 lbs. of water, the temperature of which is 0° C. ; describe what occurs, and state what will be the temperature of the water at the conclusion of the experiment.

3. How is the absorption of heat affected by color ? How is the radiation of heat affected by color ? Describe simple experiments by which you would prove your answer.

4. State the laws of refraction of a beam of light passing from water or glass into air, and describe experiments by which they might be illustrated. If a ray of light passes from spirits of turpentine into water, is it bent to or from the normal ? Give reasons.

5. Describe the Stereoscope, and explain fully the theory of its action.

6. Explain the formation of an image by a lens.

7. The image and object are to be six inches apart when the lens is between them ; what is the greatest focal length of the convex lens which will give this result ?

8. I hold in my hand a glass tumbler which I electrify on the inside by moving it about on a brass knob connected with the conductor of a machine, and then I invert the tumbler over some pith balls on a deal table and remove my hand ; state and explain the effects which ensue. When the action has apparently ceased it is again renewed if I place my hand on the tumbler ; explain why.

9. Describe the construction and action of a galvanometer.

10. Give a brief description of the Morse telegraph, and explain, with the help of a simple diagram, the mode of transmitting signals by means of it.

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No. 24.

EDUCATION.

TIME—ONE HOUR AND A HALF.

1. What end is to be kept in view, and what limitations should be observed, in inflicting punishment?

2. "The acquisition of knowledge is rather a means than the end of education." Discuss this statement.

3. Enumerate the leading principles to be kept in view by the Teacher
    (*a*) In conveying instruction.
    (*b*) In maintaining order.
    (*c*) In cultivating the conscience.

4. Give notes of an introductory lesson on
    (*a*) Proportion.
    (*b*) Grammar.
    (*c*) History.

5. Show what methods you would adopt
    (*a*) To maintain the school premises in good order.
    (*b*) To secure regularity of attendance without punishment.

6. Point out the evils commonly attending public oral examinations, and show how these may be avoided.

7. Show in detail wherein consists the difference between good and bad questioning.

8. Draw up a time table for the use of a school containing 100 scholars, an assistant teacher being employed.

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No. 25.

SCHOOL LAW.

TIME—ONE HOUR AND A HALF.

1. State generally the powers of County Public School Inspectors as to
    a. Granting and suspending Certificates.
    b. Disputed Trustee elections.
    c. Formation of Union Sections.
    d. Disputed School Accounts.
    e. Doubtful proceedings at School Meetings.

2. Wherein do the functions of a City Inspector differ from those of a County Inspector in the matters above mentioned?

3. In what cases is the County Inspector to withhold the payment of the School Grant from a School Section?

4. How does the law provide against the Township Treasurer's delay in paying the County School Fund to the Teachers?

5. In what manner is the establishment of a Township School Board authorized and effected?

6. Where the High and Public School Boards are united, what is the rule respecting Public School pupils who may be qualified to pass to the High School, but whose parents desire them to complete the Public School course?

7. The law provides a pecuniary penalty for certain offences by a Teacher. What are they?

8. By what process does the law empower Trustees in Towns and Cities to obtain funds for the support of Public Schools?

9. What is the process for uniting two Sections in a Township into one, and when does such union take effect?

10. If the Trustees employ an unqualified Teacher, can they collect a rate for his salary? Has this been tested at law?

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No. 26.

NATURAL PHILOSOPHY.

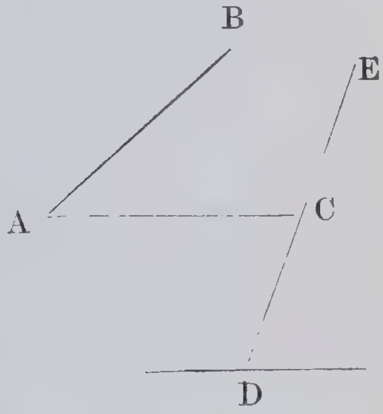
TIME—TWO HOURS AND THREE-QUARTERS.

1. A body floats in a liquid, so that less than one-half of it is immersed. By the application of a downward pressure of m ounces, it is sunk to such a depth, that the portion of it now remaining out of the liquid is exactly equal to what was previously immersed. Show that, if the excess of the sp. gr. of the liquid above twice that of the body be $\frac{1}{1000}$, the sp. gr. of water being unity, the volume of the body is m cubic feet. (See note below.)

2. (*a*) "*A body, falling from rest under the influence of gravity at the earth's surface, has acquired, after 5 seconds, a velocity of 160 feet in the second.*" Does this mean, that the body, continuing to fall for an additional second, will, in that second, pass over 160 feet? If not, what does it mean?
   (*b*) What is the meaning of the formula, $g = 32$, g being the force of gravity at the earth's surface?
   (*c*) A body, falling down an inclined plane, passes over 8 feet in the first second from rest. If f be the uniformly accelerating force (acting in the direction of the plane) to which the motion of the body is due, and g be the force of gravity, in what proportion is f less than g?

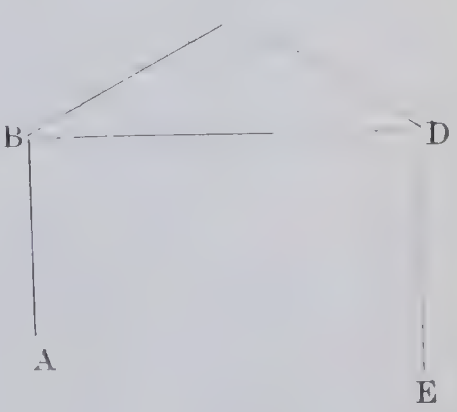
3. Let ABCD be a parallelogram such that each of the four sides is equal to the diagonal AC. Bisect AC in E. A particle at A being acted on by three forces represented in magnitude by AD, $(1+2\sqrt{\tfrac{1}{3}})$ AE, and $\frac{1}{2}(1+\sqrt{\tfrac{1}{3}})$ AB, respectively, and in direction by AD, EA (not AE), and AB, respectively, prove that their resultant is in the direction of the diagonal of a square described on AC.

4. A uniform heavy rod, AC (which may be considered as a line), is in equilibrium, in a horizontal position, with one end C resting on a smooth inclined plane ED, and the other end A connected by a string AB with a fixed point B. Prove that the tension of the string, and the reaction of the plane on the rod, are equal to one another.

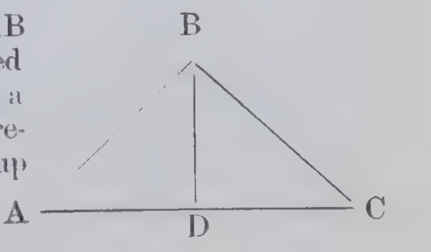


5. Let two particles, whose weights are m and n, respectively, begin at the same instant to move, the former from A, in the direction AB, under the influence of a uniformly accelerating force which imparts to it a velocity of $\frac{nf}{m+n}$ feet in the second, and the latter from B, in the direction BA, under the influence of a uniformly accelerating force, which imparts to it a velocity of $\frac{mf}{m+n}$ feet in the second. Inquire whether, as the particles move towards one another, their centre of gravity alters its position.

6. Let BCD be a triangular board, forming two opposite inclined planes, BD being horizontal. Suppose a perfectly flexible uniform heavy cord ABCDE, weighing 14 lbs., to pass over it, the portions BA and ED hanging vertically. Let the lengths of AB, BC, CD, and DE, be 6 ft., 8 ft., 6 ft., 8 ft., respectively. The cord being supposed capable of moving freely in virtue of its own weight, inquire what weight (if any) must be attached to either extremity (A or E as the case may be) in order that equilibrium may subsist.



7. Let ABC be a double inclined plane, whose perpendicular height BD is 9 ft.; AB and BC being each 16 ft. A weight W of 40 lbs., resting on BC, is connected with a weight P, of 32 lbs., resting on BA, by a string passing freely over a fixed pulley at B, the portions of the string being parallel to CB and BA respectively. Prove that W, descending from rest along BC, and drawing P up AB, will pass over a space of one foot in the first second.



NOTE.—The weight of a cubic foot of water may be assumed to be 1000 oz., and the atmospheric pressure to be 15 lbs. on the square inch.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 27.

ARITHMETIC.

TIME—THREE HOURS.

1. A person asked for a lot of land 40 per cent. more than it cost him, but finally reduced his price 15 per cent., gaining on the whole $1000: for how much did he sell the land?

2. A Washington despatch to the *Globe*, September 14, says: "Explanation is made to the Treasury Department that the Coinage Act of 1873, by which the value of the pound sterling was altered from $4.84 to $4.8665, will increase the protective duties upon the imports from Great Britain to the United States by a little more than one-half of one per cent." Explain this statement, and find exactly the increase per cent referred to.

3. The difference between the true and the bank discount of a note of $5,300, payable in 9 months, is $18. Find the rate per cent.

4. A speculator gained 25 per cent. on three-fourths of his investment, and lost ten per cent. on the remainder, and his net profits were $1000: what would have been the result had he lost 10 per cent. on three-fourths of his investment, and gained 25 per cent. on the remainder?

5. A banker in Toronto remits $10,000 to Liverpool as follows: first to Paris, at 5 francs 40 centimes per $1; thence to Hamburg, at 185 francs per 100 marcs; thence to Amsterdam, at $17\frac{1}{2}$ stivers per marc; thence to Liverpool, at 220 stivers per pound sterling: how much sterling money will he have in bank at Liverpool, and what will be his gain over direct exchange at 10 per. cent. premium?

6. A merchant buys on January 1st a quantity of Coffee at 25c. a pound, and another quantity at 20c., and Chicory at 8c. a pound. On April 1st he mixes them together in the proportion of two parts of the better Coffee to three parts of the poorer and five parts of Chicory, and immediately sells half the mixture at 18c. a pound. On 1st July he finds half the remaining stock damaged in consequence of a leak in his warehouse, and sells out the damaged part (12,700 lbs.) at 7c., and at the end of the year he sells the remainder, money being worth 7 per cent. during the year, and rent of warehouse being $200, payable at the end of the year: what must he get per pound for the portion last sold in order to make 5 per cent. on the whole cost at the end of the year?

7. Three men form a partnership: A's money was in 8 months, and he received $500 of the profits; B's was in 9 months, and he received $360 of the profits; and C's was in 10 months, and he received $800 of the profits: find the Capital each put in.

8. A mortgage, dated 1st January, 1872, payable in three equal annual payments of $200 each, with interest, payable half-yearly at 6 per cent., is sold on the 1st July, 1872: what sum must the purchaser pay so that the investment may be worth 8 per cent.?

9. Two circles of given radii touch externally, and a common tangent is drawn intersecting the line joining their centres in P. If the tangent touch the circles in Q, R, respectively, find the area of the rectangle contained by PQ, PR.

10. Find:
    (1) The area of a quadrant whose radius is 4 rods.
    (2) The solidity of a cone whose altitude is 6 feet and circumference of base 7 feet.
    (3) The surface of a sphere 5 feet in diameter.
    (4) The length of the side of a cubical vessel that shall contain three times as much as one whose side is 2 feet.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 28.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

> "The aggregated soil
> Death with his mace petrific cold and dry,
> As *with* a trident smote, and fixed as *firm*
> As Delos floating *once*; the rest his look
> Bound with Gorgonian rigour not to move;
> And with asphaltic slime, *broad* as the gate,
> *Deep* to the roots of Hell the gathered beach
> They fastened, and the *mole* immense *wrought on*
> *Over* the foaming deep high *arched*, a *bridge*
> Of length prodigious, *joining* to the wall
> Immoveable of this now senseless world
> *Forfeit* to death; from hence a passage broad,
> Smooth, easy, inoffensive, *down* to Hell."
> Milton: *Par. Lost, Book X, ll.* 293–305.

1. Divide the extract into propositions, state their relations to one another, and analyze them.

2. Parse the fourteen italicized words.

3. Parse the italicized words in the following sentences—

   "*Farthest* from him is best."
   "He told me his sad story on the way *thither*."
   "She saved ten dollars a year out of her wages as a *servant*."

4. Correct or justify the forms of expression employed in the following sentences:—

   "Nobody but the good go to Congress."
   "I did groan
   To think that a most unambitious slave,
   Like thou, shouldst dance and revel on the grave
   Of Liberty."
   "The hue and cry was raised."
   "Having discussed the future of the good, consider we now the destiny of the wicked."
   "Failing this arrangement, will you be so good as to come to my assistance."

5. Define the rhetorical figures of which the following quotations are illustrative:—

   "Can gray hairs make folly venerable?"—*Junius.*
   "To Adam Paradise was a home; to the good among his descendants home is a paradise."—*Hare.*
   "Pity, the violet on the tyrant's grave."—*Tennyson.*

6. Explain with the aid of examples the meaning of the terms Grammatical Equivalent and Conjunctive Adverb.

7. Specify and exemplify the various constructions in which the sign of the possessive case is omitted.

8. Write half-a-dozen lines on any subject you choose using only words of Anglo-Saxon origin.

9. Classify the words in the passage from Milton according to their origin.

10. Give the derivation and trace the history of the meaning of *lesson*, *mean*, *peer*, *impostor*, *insolent*.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 29.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1 Explain fully what is meant by saying that the Queen is a constitutional sovereign.

2. Write historical notes on "The Star Chamber;" "The Act of Conformity;" "The Act of Uniformity;" "The Test Act."

3. Compare the foreign policy of Cromwell with that of Charles II.

4. Connect the following dates with important political events in British history: 1265, 1587, 1649, 1660, 1829

5. Describe the condition of public affairs between England and Scotland in 1547 and 1647, respectively.

6. On what occasions have the public policy of Spain and that of England been in conflict, and with what results?

7. *(a)* Describe the system of government established in Canada on its cession in 1763, and state its results.
   (b) Mention, in chronological order, with dates, the successive steps by which Canada has reached self-government.

8. Mention briefly, in order, the principal events in Roman history from the formation of the first Triumvirate to the battle of Actium.

9. Compare the French Revolution of 1789 with those of more recent date.

10. State the causes which, during the last quarter of a century, have brought France into collision with Russia, Austria, and Prussia, respectively.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 30.

BOOK-KEEPING.

TIME—ONE HOUR AND A QUARTER.

1. Journalize the following items:—

TORONTO, *January 1st*, 1873.

Jan.
1. I have on hand: Cash $1,019,50; Goods, $4,868.45.
1. Received from John Black & Co., Goods as per invoice, $470.75.
1. Received for Cash Sales this day, $52.87.
1. Paid James White, on account, $80.
2. Received from Mr. Gordon's Legacy, deducting duty, $75.50.
2. Received for Cash Sales this day, $54.85.
3. Received from James White, Edition of Euclid's Elements, per invoice, $300.65.
3. Received for Cash Sales this day, $45.48.
4. Sold A. Macarthur: 1 Euclid, $1.50; 1 Walker's Dictionary, $2.10; 6 Spelling Books at 15c., $0.90; 50 Reading Books at 40c., $20. Paid James White, on account, $160. Received for this day's Sales, $20.45.
5. Remitted John Black & Co., on account, $400. Received from James White: Spelling Books, per invoice, $11.20. Received for Sales this day, $61.50.
6. Received from John Black & Co., Goods, per invoice, $213.60.
6. Sold A. Macarthur: 24 Scripture Geography at 10c., $2.40; 100 Readers at 60c., $60; 20 Dictionaries at 50c., $10. Paid James White, on account, $71.85. Paid half-year's Rent of Warehouse, $200.
6. Bought a House, and received for my bargain $80. Amount of this day's Sales (Cash), $31.64.
8. Received from A. Macarthur, on account, $80. Sold A. Macarthur: 10 Arithmetics at 60c., $6; 12 Geographies at 40c., $4.80. Remitted John Black & Co., on account, $240. Received for this day's Cash Sales, $48.87.
9. Lost a Bank Note, value $40. Took Stock, and found in my possession:

Cash,.............................	$227.81	
Goods,................................	5,594.50	
Debts due to me,................	27.70	
		$5,850.01
Debts due by me,..............................		44.35

2. Open the necessary accounts, for the above transactions, in the Ledger, and close the accounts.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No, 31.

ENGLISH LITERATURE AND COMPOSITION.

I. LITERATURE.

TIME—ONE HOUR AND A QUARTER.

N.B.—Candidates may select any two of the following questions, but must not answer more than two.

1. Sketch the lives of Sir Thomas More and Lord Bacon.
2. Discuss the influence of the Puritans on the literature of the seventeenth century.
3. Name and characterize the chief works of Pope and Cowper.

II. COMPOSITION.

TIME—ONE HOUR.

Candidates may select any one of the following subjects.

1. A Bank-note.
2. Man is a bundle of habits.
3. " Our sincerest laughter with some pain is fraught,
   Our sweetest songs are those that tell of saddened thought."

The Presiding Examiner is directed to collect the answers to the questions on Literature one hour and a quarter after the commencement of the Examination, in order that one hour may be left for Composition.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 32.

BOTANY AND AGRICULTURE.

TIME—ONE HOUR AND A HALF.

1. Explain the meaning of the terms Gymnospermous, Monoecious, Perfect Flower, Follicle, Stipule, Fascicled.

2. Draw a tap-root, a halberd-shaped leaf, a sinuate leaf, a spike, and a compound umbel.

3. What is the botanical distinction between a thorn and a prickle?

4. What chemical change does the albumen of the seed undergo in germination? Give an account of the various ways in which plants store up a stock of nourishment for future use.

5. Give the characters of the Cress and Rose families.

6. Botanically describe, and name any native plant you know.

7. To what families do the Thistle, Onion, Mullein and Catnip, respectively belong? Botanically name and describe any one of them.

8. To what family do the following characters apply?
"Herbs with small flowers in compound umbels, the 5 petals and 5 stamens on the top of the ovary, with "which the calyx is so incorporated that it is not apparent, though sometimes represented by 5 minute "teeth. Styles 2. Fruit Dry, 2-seeded, splitting when ripe into two akenes. Stem hollow, leaves generally "compound, decompound or much cut."

9. Discuss the value of gypsum, salt and soot as manures.

10. Give an account of the means you would employ, and the method you would follow in order to secure a good crop of winter wheat.

11. What means should a farmer adopt in order to guard against the impoverishment of the soil? Explain how soils may become poor under cultivation.

12. For what crops is a very stiff clay most suitable?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 33.

EUCLID.

TIME—TWO HOURS AND THREE QUARTERS.

1. Let AB, BC, CA, the sides of a triangle ABC, be 4 ft., 5 ft., and 6 ft., respectively ; and let BD be the perpendicular let fall from B on AC. Enunciate a proposition of Euclid, from which the length of AD can be deduced, and find AD.

2. What is meant by the distance of a line from a point?
Straight lines in a circle which are equally distant from the centre are equal to one another.

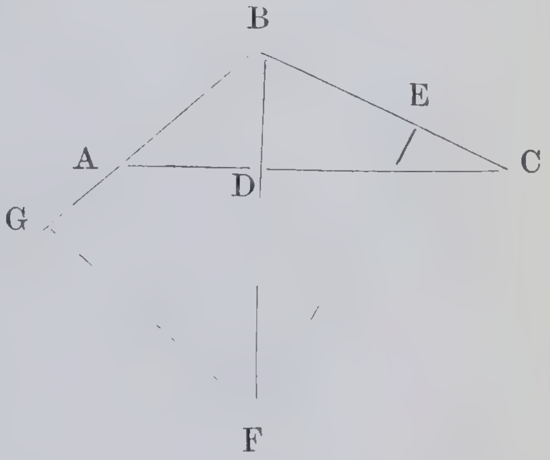
3. To describe an isosceles triangle, having each of the angles at the base double of the third angle. (The candidate may assume the construction to be made ; A being the centre of the larger circle, BD the line placed in that circle, and ACD the triangle in the smaller circle. The proof may then be proceeded with, so far as to show that the lines DB and DC are equal to one another ; it need not be carried further).

4. If two triangles have one angle of the one equal to one angle of the other, and the sides about two other angles proportionals ; then, if each of the remaining angles be less than a right angle, the triangles shall be equiangular to one another.

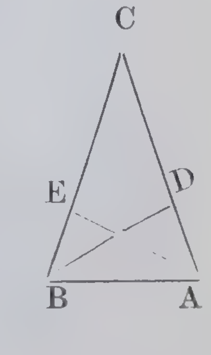
5. If two triangles, which have two sides of the one proportional to two sides of the other, be joined at an angle so as to have their homologous sides parallel to one another, the remaining sides shall be in a straight line.

6. If BD be the diagonal of a parallelogram, ABCD ; and the straight lines, DE, DF, be let fall perpendicular on BC and BA, respectively ; prove that the sum of the rectangles CB.BE and AB.BF is equal to the square of DB.

7. From B, the vertex of a triangle ABC, let fall BD perpendicular to AC. Cut off BE = BA ; and let EF, at right angles to BC, meet BD produced in F. Let fall FG perpendicular to BA produced. Prove that BG = BC.



8. If EA and BD, straight lines drawn from the extremities of the base of a triangle to points in the opposite sides be equal to one another, prove that the perpendicular let fall from C on the line drawn through A parallel to BD, is equal to the perpendicular let fall from C on the line drawn through B parallel to EA.



PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 34.

GEOGRAPHY.

TIME—TWO HOURS.

1. Describe some of the principal effects of igneous agency in modifying the earth's crust.

2. "The order of succession, or superposition, is the great key to the solution of all geological problems." Explain.

3. Enumerate the principal volcanic products, and state their economic uses.

4. Describe the great *Telegraphic Plateau* of the Atlantic.

5. Upon what do the currents of the ocean chiefly depend? Describe the great equatorial current of the Atlantic.

6. Describe the physical features of S. America.

7. Explain the terms *Eccentricity of Orbit*, *Perigee*, *Parallax*, *Mean Solar Day*.

8. Given, on March 21st, the sun's meridian altitude 30°, the sun being south of the observer; the local time being 3h. 15m. p.m. when it is 10 a.m. by first meridian time; find the latitude and longitude of the place. Explain the process.

9. How is the sun's distance from the earth ascertained?

10. Into what groups are the West Indies divided, and to what Powers do they respectively belong?

11. Trace the course of the La Plata, Rhine, and Nile, naming chief cities on each.

12. Blenheim, Chincha Islands, Acapulco, Bonn. Where, and for what remarkable?

13. Name the Counties of Ontario on L. Huron, their Co. Towns and Rivers.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th DECEMBER, 1873.

No. 35.

ZOOLOGY AND PHYSIOLOGY.

TIME—ONE HOUR AND A HALF.

1. Give the characters of the classes of vertebrate animals. What organs in fishes are homologous with the wings of birds?

2. Explain the terms Plantigrade, Marsupial, Pupa, Cilia, Polygastric.

3. Give a general view of the respiratory systems of the Animal Kingdom.

4. Sketch the history of a butterfly from the egg.

5. Give the class, order, and where you can the genus of the following animals:—The Catfish, Loon, Beaver, Woodchuck, Quail, Garter Snake, Dragon-fly, Potato-bug, Snail, Ant, Trichina Spiralis, Sheep-tick.

6. Distinguish by zoological characters, a whale from a fish.

7. What distinctions separate the Arachnida from the Insecta.

8. Fully explain how animal heat is generated, and by what means its uniformity is maintained.

9. Describe the human brain.

10. State the position and explain the functions of the Eustachian Tube, the Lacteals, the Epiglottis, the Cochlea.

11. Describe fully the process of nutrition in a human being.

(CONFIDENTIAL.)

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd AND 3rd CLASS CERTIFICATES.

COMMENCING 15th DECEMBER, 1873.

ANSWERS TO QUESTIONS.

ALGEBRA.

1. $\frac{a^2}{b^2}+\frac{b^2}{a^2}+1$.

3. $\dfrac{x^2+\frac{x}{2}+\frac{1}{3}}{x^2-\frac{x}{2}-\frac{1}{3}}$

4. *(a)* Book-work.
   (b) — 99.

5. Zero.

6. $x=\dfrac{43-14m}{14m-13}$

7. $\frac{2}{3}$.

8. $x=3$.
   $y=1$.

9. 13.

10. By $\frac{3}{7}$ of a mile in the hour.

ARITHMETIC, CLASS II.

1. 120.

2. Book-work.

3. 3000 lbs.

5. \$7.11$\frac{1}{9}$.

6. \$6993.75.

7. \$1.06$\frac{2}{3}$.

8. \$11.73+.

9. 1714$\frac{2}{7}$,
   2285$\frac{5}{7}$.

10. \$250.

11. He loses \$13$\frac{1}{3}$.

12. 75 $\sqrt{3}$ sq. feet.

NATURAL PHILOSOPHY.

1. Book-work.

2. 1 lb.

3. Equal to one another.

4. Book-work.

5. *(a)* Book-work.
   (b) 8 lbs.

6. 312$\frac{1}{2}$ oz.

7. *(a)* 5 cubic feet.
   (b) 64830 lbs.

8. Nothing; 1000 oz.; 500 oz.

9. Sum of the resolved parts in the direction AB is $\frac{3}{2}$; sum of the resolved parts in direction AD is also $\frac{3}{2}$. Therefore resultant $=\frac{3}{2}\sqrt{2}$.

ARITHMETIC, CLASS III.

1. £3 : 17 : 10$\frac{1}{2}$.

2. \$17.70.
   \$11.80.

3. $\frac{67}{160}$.

4. 58 cents.

5. \$5.06$\frac{1}{4}$.

6. C, \$$\frac{2}{3}$;
   B, \$2;
   A, \$3$\frac{1}{3}$.

7. \$310.08.

8. \$1535.

9. \$175.50.

10. 7$\frac{7}{23}$ feet.

11. \$1267.93$\frac{1}{3}$.

PROVINCE OF ONTARIO.

Department of Public Instruction.

PUBLIC SCHOOL TEACHERS' EXAMINATION, DECEMBER, 1873.

EXTRACTS FROM THE OFFICIAL REGULATIONS.

Time and Place of each Examination.—The half-yearly examination of candidates for Second and Third Class Certificates shall be held in each County Town in such building as may be appointed by the Inspector, who shall give at least three weeks' public notice thereof, in such manner as he shall deem expedient. The examination of candidates for First-class Certificates shall be held at the same place [at the time mentioned below]; but all candidates for First-class Certificates, who do not already possess Second-class Provincial Certificates, shall be required to previously pass the examination for such Second-class Certificate. No person is eligible to be a candidate for a Second-class Certificate, unless he shall have previously obtained a Third-class Certificate under the present system of examination, or a First or Second-class Certificate under the former system.

Proceedings at each Examination.—The Inspector shall preside at the opening of each examination; and at the hour specified on the first day, and in the presence of such of his colleagues as may be there, and of the candidates, he shall break the seal of the package of examination papers received for that examination, from the Education Department. He shall also break open the seal of each additional packet of examination papers as required, in the presence of a co examiner and of the candidates. He shall further see that at least one examiner is present during the whole time of the examination, in each room occupied by the candidates. He shall, if desirable, appoint one or more of his examiners (1) to preside at the examination in any of the subjects named in the programme; (2) to read and report upon the answers as they are received.

DAYS AND HOURS OF EXAMINATION FOR SECOND AND THIRD CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, COMMENCING 15TH DECEMBER, 1873.

DAY.	TIME.	SUBJECT.	CLASS.	NO. OF PAPER.
Monday, 15th December.	1 30—4 30 P.M.	Chemistry, Botany and Physiology.	(2)	(1)
Tuesday, 16th "	9—12 Noon.	English Grammar and Etymology.	(2, 3)	(2, 3)
	2—5 P.M.	Arithmetic and Mensuration.	(2, 3)	(4, 5)
Wednesday, 17th "	9—11 30 A.M.	Education and School Law.	(2, 3)	(6, 7, 8)
	11 40—12 40 P.M.	Reading and Dictation.	(2, 3)	(9)
	2—4 15 P.M.	History.	(2, 3)	(10, 11)
Thursday, 18th "	9—11 A.M.	Geography.	(2, 3)	(12, 13)
	11 10—12 40 P.M.	Music and Drawing.	(2)	(14)
	2—4 30 P.M.	Euclid.	(2)	(15)
Friday, 19th "	9—11 45 A.M.	Natural Philosophy.	(2)	(16)
	11 55—1 10 P.M.	Book-keeping.	(2)	(17)
	2 25—4 55 P.M.	Algebra.	(2)	(18)
Saturday, 20th "	9—10 30 A.M.	Composition.	(2)	(19)
	10 40—1 10 P.M.	Natural History, Botany and Agriculture. (Special Paper.)	(2)	(20)

NOTE.—Should the time allowed for Reading and Dictation be found insufficient, the Examiners will make such other special arrangements for Reading as may seem to them most convenient.

DAYS AND HOURS OF EXAMINATION FOR FIRST-CLASS CERTIFICATES OF QUALIFICATION FOR PUBLIC SCHOOL TEACHERS, COMMENCING 26TH DECEMBER, 1873.

DAY.	TIME.	SUBJECT.	NO. OF PAPER.
Friday, 26th December.	1 45—4 30 P.M.	Algebra.	(21)
Saturday, 27th "	9—11 A.M.	Chemistry.	(22)
	11 10—1 10 P.M.	Physics.	(23)
	2 30—4 P.M.	Education.	(24)
Monday, 29th "	11 A.M.—12 30 P.M.	School Law	(25)
	2—4 45 P.M.	Natural Philosophy.	(26)
Tuesday, 30th "	9—12 Noon.	Arithmetic and Mensuration.	(27)
	1 15—4 15 P.M.	English Grammar and Etymology.	(28)
Wednesday, 31st "	9—11 15 A.M.	History.	(29)
	11 30—12 45 P.M.	Book-keeping.	(30)
Friday, 2nd January.	9—11 15 A.M.	English Literature and Composition.	(31)
	11 30—1 P.M.	Botany and Agriculture.	(32)
	2—4 45 P.M.	Euclid.	(33)
Saturday, 3rd "	9—11 A.M.	Geography.	(34)
	11 15—12 45 P.M.	Zoology and Physiology.	(35)

Education Office,
Toronto, November, 1873.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES—DECEMBER, 1873.

Values assigned by the Central Committee of Examiners.

See "General Regulations respecting the Examination of Candidates," &c., Nos. 7 and 8.

(1) CHEMISTRY, BOTANY & PHYSIOLOGY

Questions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total.
Number of marks for perfect answers	12	11	14	15	15	12	15	18	15	10	16	16	14	14	200

(2) (3) ENGLISH GRAMMAR & ETYMOLOGY

Questions		1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of marks for perfect answers	(Second Class)	57	28	20	20	24	10	11	12	12	24	12	20	250
	(Third Class)	32	45	16	15	8	17	10	12	24	10	11	..	200

(4) (5) ARITHMETIC & MENSURATION

Questions		1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of marks for perfect answers	(Second Class)	16	20	17	22	20	15	20	19	20	22	16	18	225
	(Third Class)	15	19	16	23	18	21	17	21	17	15	18	.	200

(6) EDUCATION

Questions		1	2	3	4	5	6	Total.
Number of marks for perfect answers	(Second Class)	15	20	10	18	12	10	85

(7) SCHOOL LAW

Questions		1	2	3	4	5	6	7	8	Total
Number of marks for perfect answers	(Second Class)	11	11	11	11	11	11	11	13	90

(8) EDUCATION & SCHOOL LAW

Questions		1	2	3	4	5	6	7	8	Total
Number of marks for perfect answers	(Third Class)	20	14	16	24	15	24	22	15	150

(9) READING & DICTATION. 75 marks to be given for a satisfactory exercise in each of these subjects; that is, 75 marks for each.

(10) (11) HISTORY. Number of marks for perfect answers

(Second Class). Value of fourth question, 10; of each of the others, 14. Total value of the paper, 150.

(Third Class). Value of each question, 15. Total value of paper, 150.

(12) (13) GEOGRAPHY

Questions		1	2	3	4	5	6	7	8	9	10	11	12	Total.
Number of marks for perfect answers	(Second Class)	8	8	20	10	12	12	15	24	6	15	10	10	150
	(Third Class)	16	12	30	18	20	17	15	12	10				150

(14) MUSIC

Questions	1	2	3	4	5	6	7	8	Total.
Number of marks for perfect answers	4	12	6	8	4	8	5	13	60

(14) DRAWING. Value of each question, 8. Total value of the paper, 40.

(15) EUCLID

Questions	1	2	3	4	5	6	7	8	9	10	Total value of first seven questions.	Total value, omitting questions 3 and 4
Number of marks for perfect answers	18	16	22	22	22	25	25	23	23	23	150	175

(16) NATURAL PHILOSOPHY

Questions	1	2	3	4 (a)	4 (b)	5 (a)	5 (b)	6	7 (a)	7 (b)	8	9	Total
Number of marks for perfect answers	17	17	17	12	12	14	8	22	10	10	14	22	175

(17) BOOK-KEEPING

Questions	1	2	3	4	5	6	Total
Number of marks for perfect answers	8	12	10	15	15	40	100

(18) ALGEBRA

Questions	1	2	3	4 (a)	4 (b)	5	6	7	8	9	10	Total
Number of marks for perfect answers	15	15	16	14	5	18	18	18	18	19	19	175

(19) WRITING & COMPOSITION. 75 marks to be given for a satisfactory exercise in each of these subjects; that is, 75 marks for each.

(20) PAPER FOR SPECIAL CERTIFICATES IN NATURAL HISTORY, BOTANY, AND AGRICULTURE

Questions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total.
Number of marks for perfect answers	15	12	8	14	15	9	10	12	6	8	9	10	11	11	150

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 1.

ZOOLOGY, BOTANY, AND AGRICULTURAL CHEMISTRY.

SPECIAL PAPER.

TIME—TWO HOURS AND A HALF.

1. By what differences are living bodies, whether plants or animals, distinguished from unorganized bodies ?
2. To what sub-kingdom, class, and order do the reef-building coral, the lobster, the centipede, the crocodile, the ant, and the wolf respectively belong ?
3. Give the characters of the classes Reptilia and Arachnida, and of the orders Raptores, Cheiroptera, and Cetacea.
4. Name the parts of a typical flower, and describe the classes of flowers constituted by the various departures from the type.
5. Draw a cyme, a corymb, a palmately compound leaf, and a retuse leaf.
6. Describe the Pink Family botanically.
7. Describe potassium and silicon ; name and give the chemical symbols for their more important compounds ; and explain their value as constituents of soils and plants.
8. Give an account of the steps to be taken in raising a crop of turnips.
9. Write notes on the proper care of stock.

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COMMENCING 20th JULY, 1874.

No. 2.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

> " *K. Rich.* Of comfort no man speak ;
> Let's talk of graves, of worms, and epitaphs ;
> Make *dust* our *paper*, and *with* rainy eyes
> Write sorrow on the bosom of the earth.
> Let's choose executors, and talk of wills :
> And *yet not so,—for what* can we bequeath
> *Save* our deposed bodies *to* the ground ?
> Our lands, our lives, and all, are *Bolingbroke's*,
> And nothing can we call *our own* but death
> *And* that small *model* of the barren earth
> Which serves *as paste* and cover to our bones."
>
> —SHAKSPEARE.

1. Parse the sixteen italicized words.

2. Divide the extract into propositions, state their relations to one another, and analyse them.

3. Make a list of the words of classical origin in the extract.

4. Make a list of five words from each of the Latin verbs *ago*, *curro*, *jacio*, *fero*, *video*, and *rego*.

5. Define and give examples of ADVERBIAL SENTENCE and COMPLEX SENTENCE, and form or quote a sentence containing a dependent proposition which is the subject of a verb.

6 Correct the following sentences, giving your reason for every change you make :

" Even remote and minute events are objects of a curiosity, which, being natural to the human mind, the gratification of it is attended with pleasure."—ROBERTSON : *Charles the Fifth.*

" In nearly all cases in the East, woman was kept very much under subjection, and even to the present day the female sex in the East do not enjoy that equality with the male sex which she possesses in western countries."—ANON.

" The luxuriance of the Eastern countries, their boundless wealth and tempting prospects, together with the restless, enterprising disposition of its inhabitants, at once furnishes us with scenes of social interest and political influence to which the pages of history hardly gives a parallel."—ANON.

7. Give a classification of conjunctions.

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COMMENCING 20th JULY, 1874.

No. 3.

GEOGRAPHY.

Time—Two Hours.

1. Derive and explain the terms Antarctic, Asteroid, Isothermal, Horizon, Node.
2. What is included in Mathematical Geography? Give notes of an introductory lesson on Mathematical Geography.
3. Give the form of government, religion, and capital of the following:—Siam, Persia, Iceland, Egypt, Servia, Sweden, Chili.
4. Where, and for what remarkable are Smyrna, Queenstown, Avignon, Wolverhampton, Bombay, Damascus, Jeddah, Miquelon, Antananarivo, Port au Prince, Granada, Heligoland?
5. Trace the course of the Danube, Rhone, and Susquehanna, naming the principal cities on their banks, and their chief tributaries.
6. Name the States of the American Union situated in the Valley of the Mississippi, with their capitals.
7. Describe the physical features of British Columbia.
8. Mention the seats of the hardware, linen, woollen, cotton, and earthenware manufactures of Great Britain and Ireland, and name one principal town in each locality.
9. Describe the mountain systems of South America.
10. Draw an outline map of the portion of the Dominion lying east of Quebec.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20TH JULY, 1874.

No. 4.

BOOK-KEEPING.

TIME—ONE HOUR AND A QUARTER.

1. Explain the difference between Single and Double entry.

2. Describe the Day Book, Ledger, Bill Book, and the Invoice Book.

3. How are the following accounts balanced: Merchandise, Interest, Private Accounts.

4. Describe fully a Trial Balance?

5. What errors may occur in posting which the Trial Balance will not discover?

6. Give Day Book entries which would be journalized as follows:

(1). Merchandise, Dr.—			
To Bank of Commerce			$300 00
(2). Bills Payable. Dr. to Sundries—			
Interest		$50 00	
Cash		500 00	
			550 00
(3). Merchandise, Dr. to Sundries—			
Cash		250 00	
Bank of Commerce		750 00	
W. Smith & Co.		875 00	
			1875 00
(4). Sundries, Dr. to Sundries—			
Merchandise	$300 00		
Interest	4 00		
Bills Receivable		200 00	
Cash		104 00	

7. Journalize the following Day Book entries:

(1). Received from H. A. Smith & Co., Montreal, to be sold on their account and risk, 200 bbls. Fish, invoiced at $950 per bbl. Paid freight and cash $110 00.

(2). Shipped per Steamer "Toronto," and consigned to Morrison & Co., Montreal, to be sold on our account and risk:

Merchandise as per invoice	$3000 00
Paid Labor and Insurance	85 00

(3). Closed H. A. Smith & Co.'s Consignment, and rendered them account of Sales of the same:

Our charges for Storage and Advertising	$54 00
" Commission	60 00

H. A. Smith & Co.'s net proceeds...... $1886 $\frac{00}{100}$.

(4). Thomas Jones has redeemed his note, due three month's hence, for	$1200 $\frac{00}{100}$	
Discount allowed him	18 $\frac{00}{100}$	
Received the balance in cash		$1182 00

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 5.

ARITHMETIC.

TIME—THREE HOURS.

1. Find the quotient (expressed as a vulgar fraction) of,

$$1\tfrac{1}{2} + \frac{\frac{3}{5}\text{ of }4\frac{1}{2}}{\frac{9}{10}} - \frac{5\frac{1}{3}}{8} - \frac{4\frac{1}{2} - 1\frac{2}{3}\text{ of }1\frac{4}{5}}{\frac{1}{3}+\frac{1}{6}+\frac{1}{12}+\frac{1}{24}} \quad \text{divided by,} \quad 1\tfrac{1}{2}\text{ of }3\tfrac{1}{4} + \cdot016' + \frac{1\frac{1}{8} - \frac{1}{4}}{2\frac{1}{2} + \frac{1}{8}} + \frac{1\cdot25}{\cdot08}$$

2. If a number be increased 20%, and the amount be increased $16\frac{2}{3}$%, the result will be 280; find the number.

3. Twenty men can do a piece of work in 12 days; find how many men will do half as much again in one fifth part of the time, supposing that they work the same number of hours in the day, and that two of the second set can do as much work in an hour as three of the first set.

4. A grocer intended to gain 8% on a stock of tea, and fixed his price accordingly; when he had sold two-thirds of the stock he was compelled to reduce the price 10 cents a pound, and so gained only half as much as he had intended. What was the original cost per lb. of the tea?

5. Shew that $\dfrac{3\sqrt{8} - 2\sqrt{7}}{\sqrt{8} - \sqrt{7}} = 17\cdot483 \ldots$

6. A sells goods to B at a loss of 4%, B sells them to C at a loss of $6\frac{1}{4}$%, C sells them to D for $390.60, gaining $8\frac{1}{2}$%; find the prime cost of the goods.

7. A and B invest capital in the proportion of $3\frac{1}{2}$ to 4. After five months A withdraws one-half his capital, and B withdrews two-thirds of his. At the end of the year they have gained $7,090; find each man's share.

8. A bankrupt has book-debts equal in amount to his liabilities, but on $24,000 of them he realizes only $66\frac{2}{3}$ cents in the dollar, and the expenses of the bankruptcy are 5% on the book-debts; he pays 65 cents in the dollar; find the amount of his liabilities.

9. A merchant in Boston has 10,000 francs due him on account in Paris, he can draw on Paris for this amount, and negociate the bill at $19\frac{2}{5}$ cents per franc, or he can advise his correspondent in Paris to remit a draft on Boston, purchased with the sum due him, exchange being at the rate of 5 francs 20 centimes per dollar. What sum does he save by adopting the more profitable course?

10. How many flag-stones, each 5·76 ft. long and 4·15 ft. wide, are required for paving a cloister 12·45 ft. wide which encloses a rectangular court 45·77 yds long and 41·93 yds. wide?

11. When the 3 per cent. are at 96, how much stock must be sold out to pay a bill of £1,664 9 months before it becomes due, real discount being allowed at $4\frac{1}{2}$ % per annum?

12. A pile of bricks in the form of a parallelopiped contains 3,000 cubic feet, and the length, breadth and thickness are as 4, 3 and 2 respectively; find the dimensions of the pile.

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EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20TH JULY, 1874.

No. 6.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS AND A HALF.

1. Mention the qualifications which, in your opinion, are necessary to form the accomplished Teacher.

2. Give an outline of any work on Education which you may have studied, and express your opinion of it.

3. State the various educative influences to which Canadian children are usually subjected, and estimate their relative force in *training* the young.

4. Enumerate the particulars in respect to the external condition of (*a*) premises, and (*b*) pupils, which demand the Teacher's daily inspection.

5. What is comprehended in "Discipline?" Regarding it as School-government, point out prevalent faults in Schools; and describe the system of "a good disciplinarian."

6. How would you explain to a class the difference between Vulgar and Decimal Fractions? Give twelve examples of the kind of questions you would put to the class in order to test their knowledge of Fractions.

7. Enumerate the essentials of good Reading; and describe your method of teaching the Third Book.

8. What, under the Regulations, constitutes "adequate School accommodation?"

9. What are the specific duties of Public School Teachers, as laid down in the Act?

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2nd and 3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20TH JULY, 1874.

No. 7.

DICTATION AND READING.

N.B.—This Paper is not to be shown to Candidates.

DICTATION.

"Without committing ourselves to it as more than a speculation, though a highly probable one, let us again commence with the evolution of the solar system out of a nebulous medium. From the mutual attraction of the atoms of a diffused mass, whose form in unsymmetrical, there results not only condensation but rotation: gravitation simultaneously generates both the centripetal and the centrifugal forces. While the condensation and the rate of rotation are progressively increasing, the approach of the atoms necessarily generates a progressively increasing temperature. As this temperature rises, light begins to be evolved; and ultimately there results a revolving sphere of fluid matter, radiating intense heat and light—a sun."

READING.

Fifth Reader, page 260:—"There was reason to suppose from * * * * * act after them."

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 8.

EUCLID.

TIME—TWO HOURS AND THREE QUARTERS.

Note.—Candidates who take only Book I. will confine themselves to the first 7 questions. Those who take Books I and II., will omit questions 1, 2, and 3.

1. When is one straight line said to be *perpendicular* to another ?
   To draw a straight line perpendicular to a given straight line of an unlimited length, from a given point without it.

2. If one side of a triangle be produced, the exterior angle shall be greater than either of the interior opposite angles.

3. If two triangles have two angles of the one equal to two angles of the other, each to each ; and one side equal to one side, namely, sides which are opposite to equal angles in each ; then shall the other sides be equal, each to each.

4. What are *parallel straight lines ?*
   If a strait line, falling on two other straight lines, make the alternate angles equal to one another, the two straight lines shall be parallel to one another.

5. What is a *parallelogram ?*
   Parallelograms on equal bases, and between the same parallels, are equal to one another.

6. If two isosceles triangles be on the same base, and on the same side of it, the strait line which joins their vertices, will, if produced, cut the base at right angles.

7. Let ABC be a triangle, in which the angle ABC is a right angle. From AC cut off AD equal to AB, and join BD. Prove that the angle BAC is equal to twice the angle CBD.

8. If a straight line be divided into two equal parts and also into two unequal parts, the rectangle contained by the unequal parts, together with the square on the line between the points of section, is equal to &c. (5. II.)

9. In every triangle, the square on the side subtending an acute angle is less than the squares on the sides containing that angle, by &c. (13. II). (It will be sufficient to take the case in which the perpendicular falls within the triangle.

10. To describe a square that shall be equal to a given rectilineal figure.

11. The square on any straight line drawn from the vertex of an isosceles triangle to the base is less than the square on a side of a triangle by the rectangle contained by the segments of the base.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 9.

HISTORY

TIME—TWO HOURS AND A QUARTER.

1. Give a short account of the Roman occupation of Britain, with dates where you can.
2. Explain concisely what is meant by "Monopolies," "The Lollards," "The High Court of Justice," "The Great Commoner."
3. When was the foundation of the British power in India laid, and by what means?
4. Give a short account of the reign of Queen Elizabeth.
5. State what you know of The Treaty of Troyes; The Act of Settlement; The war of the Spanish succession.
6. Who were the great navigators that followed Columbus on voyages of discovery?
7. Give a brief sketch of the career of Champlain in Canada.
8. What were the chief causes which led to the establishment of the present constitution of the Dominion?
9. With what important historical events are the following places connected:—Salamis, Arbela, Zama, Ryswick, Limerick, Saratoga, Appomattox? Give the dates.
10. State briefly what you know of the Emperor Maximilian of Mexico.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 10.

ENGLISH COMPOSITION.

TIME—ONE HOUR AND-A-HALF.

Any one of the following subjects may be chosen :—

A description of the town in which the examination is held.

"The proper study of mankind is man."

The Post-office.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 11.

ALGEBRA.

TIME—Three Hours.

1. Add the fractions,
$$\frac{x+3y}{x-2y},\quad \frac{3y-x}{x+2y},\quad \frac{x^2-4y^2-10xy}{x^2-4y^2},$$
expressing the result in the simplest form.

2. Reduce the fraction,
$$\frac{6x^2+5xy-6y^2}{6x^3-x^2y-17xy^2-3y^3},$$
to its lowest terms.

3. Find x from the equation,
$$\frac{mx+9}{x^2-\frac{1}{4}}-\frac{mx-9}{x-\frac{1}{2}}+\frac{mx+10}{x+\frac{1}{2}}=0$$

4. Find x from the equation,
$$x-\frac{2x-3m+1}{5}-\frac{3-\frac{1}{2}(4x-5-8m)}{7}=\frac{39x+2m}{70}$$

5. Solve the simultaneous equations,
$$3x+my=5,$$
$$mx-2y=\frac{5m-m^2-6}{3}$$

6. Solve the simultaneous equations,
$$\frac{5}{x-2y}-\frac{3}{x+2y}+2=0,$$
$$\frac{7}{x-2y}+\frac{2}{x+2y}-\frac{17}{5}=0$$

7. A has a younger brother, B. The difference between their ages is $\frac{3}{5}$ of the sum of their ages. By adding twice B's age to 5 times A's, we obtain the age of the father; and by subtracting twice B's age from 5 times A's, we obtain the age of the mother. Show that the age of the mother is $\frac{9}{11}$ that of the father.

8. A speculator borrows a sum of money at the yearly interest of 7 per cent.; part of the amount he invests at 8½ per cent., and the remainder at 9; and, at the end of the year, he finds that he has made a profit of $75; but, had the former part been invested at 9 per cent., and the latter at 8½, his profit at the end of the year would have been only $65. Find the whole sum borrowed.

9. (*a*) If $\frac{a}{b}=\frac{c}{d}$, prove that $\frac{a}{b}=\frac{a+2c}{b+2d}$.

(*b*) Find the value of $\frac{x+7}{2y+13}$ when $\frac{3x+7}{4y+8}=\frac{7}{9}$

PROVINCE OF ONTARIO.

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OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 12.

NATURAL PHILOSOPHY.

TIME—THREE HOURS.

1. ACB is a bent lever, the fulcrum being C. The arms AC and CB are straight; and the angle formed by BC and AC produced is $\frac{2}{3}$ of a right angle. If a weight of 10 lbs. acting at A balance a weight of 8 lbs. at B when the arm AC is horizontal, find what weight at A will balance a weight of 8 lbs at B, when BC is horizontal.

2. (*a*) Enunciate the principle of virtual velocities.
   (*b*) Assuming the principle, apply it to determine the relation between the Power and the Weight in the Wheel and Axle.

3. (*a*) Draw a diagram, representing a system of pullies (three movable pullies in the system) in which a separate string passes round each of the pullies.

   (*b*) Apply the principle of virtual velocities to determine the relation between the power and the weight in this system of pullies.

4. (*a*) Enunciate the principle of the parallelogram of forces.
   (*b*) If a particle at A be acted on by two forces represented in magnitude and direction by the lines AB and AC respectively, CAB being a right angle; if the length of AB be 5 feet, and the length of the resultant of the two forces be 13 feet; find the length of AC.

5. State Boyle's law for elastic fluids, and show how it may be experimentally established.

6. Calculate the height of the barometric column, when the atmospheric pressure is $222\frac{1}{3}$ ounces on the square inch; the specific gravity of mercury being 13·6, while that of water is 1. (See *Note.*)

7. (*a*) Draw a diagram exhibiting the essential parts of the common pump, and explain the action of the Machine.
   (*b*) The height of the valve through which the water passes from the lower into the upper cylinder in the common pump, must always be less than a certain quantity, which varies with the height of the barometric column. Why so? Find the quantity referred to, when the height of the barometric column is 29·8 inches; the specific gravity of mercury being 13·6, while that of water is 1.

8. Define *Specific Gravity*. A piece of silver weighs 4 oz. in air, and 3·6 oz. in water. Find its specific gravity.

9. A body, 1 cubic foot in volume, and having a sp. gr. of $\frac{7}{10}$, while the sp. gr. of water is 1, requires a downward pressure of m oz. in order that it may be completely immersed in water. Find m. (See *Note.*—In solving this question, explain at the same time the principle on which the solution proceeds.)

10. Describe the syphon, explaining distinctly the principle of its action.

Note. The weight of a cubic foot of water may be assumed to be 1000 ounces.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 13.

MUSIC AND DRAWING.

TIME—ONE HOUR AND A HALF.

MUSIC.

1. Define the following:—Music, Scale, Interval, Chord, Semitone, Clef, Degree, Time, Canon, Round, Natural, Solfeggio.
2. Explain what is meant by "Accent" in Music, and state what are the accented parts of a bar of common time.
3. What is Syncopation, and how is strong Syncopation marked?
4. How many kinds of Octave are there in the Diatonic Scale, and of what composed?
5. Transpose a passage from the Scale of Do to the Scale of Re.
6. Write notes of an introductory lesson on the Chromatic Scale.
7. Explain the following Musical terms, and give the marks for them:—Mezzo-Staccato, Staccato, Legato, Da Capo, Dal Segno.
8. Name and distinguish the two modes of the Diatonic Scale.

DRAWING.

1. Show how to describe a Circle about an Equilateral Triangle.
2. Give the different steps in the drawing of an Ellipse.
3. Draw a design for an ornamental tiled floor, to consist of Octagons and Squares.
4. Inscribe a Circle in a Nonagon.
5. Draw a "Pointed Horse-Shoe Arch," an "Early English Arch," and a "Semi-Elliptical Arch," explaining your methods.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20TH JULY, 1874.

No. 14.

CHEMISTRY, BOTANY, AND PHYSIOLOGY.

TIME—TWO HOURS.

1. Explain the constitution of the atmosphere, and state the origin of the minor substances that occur in it.

2 What gases pass out at the top of the chimney of a lamp when it is burning? Explain the formation of those that are compound.

3. State and explain the laws which govern chemical combinations.

4. Name and describe the parts of a complete flower and leaf.

5. Explain the importance of CO_2 in relation to plant life.

6. Define the terms *endogen, exogen, legume, cereal, cotyledon, plumule.*

7. Enumerate the bones of the trunk.

8. Describe the process of digestion.

9. Classify the teeth of an adult.

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3rd CLASS COUNTY CERTIFICATES.

COMMENCING 20TH JULY, 1874.

No. 15.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

"The Sportsman *very often tells you that his* pleasure is not derived from the death or suffering *which* he inflicts; *but* he cannot *deny* that his pleasure is inseparably connected with death *or* suffering."—*E. A. Freeman.*

1. Parse the ten italicized words.

2. Divide the extract into propositions, state their relations to one another, and fully analyse them.

3. Quote any six rules of syntax that are exemplified in the following extract and point out their application:—

"Those who can judge impartially of the general principle, have no means of knowing whether the general principle is rightly or wrongly applied to particular cases."—*E. A. Freeman.*

4. Form or quote a sentence containing a dependent proposition equivalent to an adverb.

5. Re-write the following sentences so as to change the grammatical construction, but express the same meaning:—

'To me the case seems to stand thus.'
'In arguing about field sports I was arguing with people whose doings were open to the world.'
'He speaks the truth.'

6. Write the past tense, present participle and past participle of 'shoe,' 'job,' 'dye,' 'lie down,' 'omit,' 'prefer,' 'wink,' and 'chew.'

7. Write the plural of 'potato,' 'cheese,' 'policy,' 'chimney,' 'soliloquy,' and 'phenomenon'; the singular of 'species,' apparatus,' and 'indices'; and the feminine of 'beau,' 'earl,' 'lad,' 'stag,' and 'ram.'

8. Give the different forms assumed by the prefixes 'in' and 'ad' in composition, illustrating your answer by examples.

9. What are the meanings of the prefixes 'para,' 'meta,' 'ob,' and 'be,' and the affixes 'ness,' 'ly and 'dom.'

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3rd CLASS CERTIFICATE .

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No. 16.

GEOGRAPHY.

Time—Two Hours.

1. Explain the following terms : climate, glacier, delta, estuary, latitude, zenith, tropics.

2. Describe the physical features of the Province of Quebec. Be concise.

3. Mention in order the chief European ports on the Atlantic.

4. A vessel sails from Riga to Hull ; of what is her cargo likely to consist ?

5. Name in order the chief lake and river ports of the United States east of Chicago, and assign them to their respective States.

6. Enumerate the republics of Europe. What is a republic ?

7. Where, and for what remarkable, are Boulogne, Londonderry, Zante, Upsala, Culloden, Carthagena, Birmingham, Solferino ?

8. Name the rivers of Europe discharging into the Baltic, with the principal cities on their banks.

9. State what you know of the geographical distribution of coal in Great Britain and America: enumerate the chief coal fields, and mention one imporant town in each locality.

10. Draw a map of the Maritime Provinces of the Dominion.

11. Define accurately the position of the following :—Sitka, Vera Cruz, Mingan Islands, Gut of Canso, Queen Charlotte Sound, Baie Verte, The Bay Islands, Denver City, Milan, Straits of Bonifacio, Gulf of Lepanto, Restigouche River, Lake Temiscaming, Skye, Schleswig.

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3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1874.

No. 17.

ARITHMETIC.

TIME—THREE HOURS.

1. Simplify $3\frac{1}{2} \times \frac{\frac{1}{4} \text{ of } \frac{5}{9} \times 7\frac{1}{5}}{\frac{1}{3} + 4\frac{1}{2} \text{ of } \frac{4}{27}} \quad \frac{7\frac{1}{2}\left(\frac{2}{5} - 1\frac{1}{6} + \frac{3\frac{3}{4}}{7\frac{1}{2}} + \frac{4}{15}\right)}{\frac{7}{95} + 150\frac{5}{19} - 74\frac{2}{5}} \times 425.$

2. Water is composed of two gases, oxygen and hydrogen, in the proportion of 88.9 to 11.1; what weight is there of each in a cubic yard of water? (cubic foot of water weighs 1000 oz.)

3. The sum of $1,416 is to be divided among 15 men, 20 women, and 30 children in such a manner that a men and a child shall together receive as much as two women, and all the women shall together receive $480; find amount received by each man, women, and child, respectively.

4. A bankrupt who is paying 37½ cents in the dollar, divides among his creditors $3,300; what do his debts amount to?

5. It costs $96.25 to carpet a room 22 ft. 6 in. long, with carpet 27 in. wide and $1.75 a yard; find the width of the room.

6. If 3 men or 5 boys can do a piece of work in 17 days; in how many days will 5 men and 3 boys do a piece of work three time as great?

7. Find the cost of 38 yds. 2 qrs. 3 nails of cloth when 3.75 yds. cost $3,825.

8. A man invests half his fortune in land, a fifth of it in Bank Stock, a sixth in provincial debentures, and loses the remainder ($8,000) in speculation—What was his fortune at first?

9. Bought 9,000 bushels of wheat at $1.12½ a bushel, payable in 6 months; I sold it immediately for $1,06 a bushel, cash, and put the money at interest at 10 per cent. At the end of the 6 months I paid for the wheat; did I gain or lose by the transaction, and how much?

10. In an examination, Arithmetic and Grammar are valued at 200 marks each; Education, Geography and History, at 150 marks each. A candidate obtains 70% in Arithmetic, 65% in Grammar, 60% in Education, 50% in History, and 40% in Geography: find his average rate per cent (i. .e rate per cent. obtained of the aggregate marks),

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No. 18.

EDUCATION AND SCHOOL LAW.

TIME TWO HOURS AND-A-HALF.

1. Define Education; and state the various Educative influences to which young people in this country are commonly subjected.

2. What is meant by School Organization? Show how you would proceed to organize a New School of 50 Scholars.

3. Draw up a Time Table for the use of such a School.

4. Give notes of a Lesson on
   1. The Verb.
   2. Multiplication.
   3. The Sheep.

5. How would you seek to make your pupils proficient in Spelling?

6. What is the approved method of teaching the Second Book?

7. Specify the duties of Public School Teachers. What is a "Public School Teacher?"

8. How would you seek to reduce to a state of good discipline a school which had become disorderly?

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No. 19.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1. What was the origin of the American slave trade?

2. Give an account of the voyages of Marco Polo.

3. Into what provinces did the Romans divide Britain? State their relative position.

4. Name the Plantagenet Sovereigns of England. Which of them interfered in the affairs of France, and with what results?

5. State what you know of the battles of Shrewsbury and Worcester.

6. In whose reign did the following persons live, and for what were they remarkable?—William Caxton, Sir Thomas Wyatt, the Duke of Monmouth, Lord Chancellor Clarendon, Richard Arkwright, James Watt.

7. What was the Cabal Ministry?

8. State the principal causes which led to the American revolutionary war, and name in order the leading events in it. Give dates. Be concise.

9. Write brief explanatory notes on the following:—
   (*a*) The Darien Company.
   (*b*) The Treaty of Dover.
   (*c*) The Convention of Cintra.

10. Contrast the Britain of to-day with that of the time of Queen Elizabeth.

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No. 20.

ENGLISH COMPOSITION.

TIME—One Hour.

Write a letter to a Board of Trustees, recommending the establishment of a School Library.

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No. 21.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. A merchant sold $\frac{2}{5}$ of a lot of tea, at a loss of $12\frac{1}{2}$ per cent., $\frac{1}{2}$ the remainder, at a loss of 15 per cent., but realized a profit of 40 per cent. on what he had left : if he had received $25 more on this last sale, he would have gained $3\frac{1}{3}$ per cent. on the whole. Find the prime cost of the tea.

2. Shew how to find the G. C. M., and the L. C. M., of two or more fractions in their lowest terms.

3. An *ad valorem duty* of 15 per cent. is charged on a certain class of manufactured goods, yielding a revenue of $210,000 ; owing to a clamour for "protection to our infant manufactures," the duty is increased to 25 per cent., in consequence of which the consumption of the class of goods in question is diminished in the ratio of 7:10, and the goods actually imported are entered at a diminished price ; the revenue on this class of goods being now $14,000 less than before the increased duty was imposed ; find how much per cent. the *entered value* of the goods has been diminished.

4. 5 lbs. of coffee, and 4 lbs. of tea, cost $4.60 ; there is an advance of 25 per cent. on the price of the coffee, and a decline of $13\frac{1}{3}$ per cent. on that of the tea, and 5 lbs. of the former and 4 lbs. of the latter still cost $4.60. Find the price of each at first.

5. Show how to solve by analysis a question in compound proportion :

If 50 guns, firing five rounds in eight minutes, kill 300 men in 70 minutes, how many guns firing 8 rounds in 10 minutes will kill 800 in 50 minutes;

6. A owes B. a sum of money payable at the end of 4 years : B accepts of A's offer of immediate payment of the amount, less mercantile discount, at the rate of 10 per cent. per annum ; he loans the amount received at 10 per cent. interest, and finds that if he had waited for payment till the end of the four years, he would have been $160 better off. Find the amount of A's debt. The other conditions being supposed the same, what would B have lost had the debt been payable in two years? Eight years?

7. 5 men, all started together, to travel in the same direction, round an island 90 miles in circumference, and continued travelling till they all came together again : Their respective rates were 5, $6\frac{1}{4}$, $7\frac{1}{2}$, $8\frac{1}{3}$, and $10\frac{1}{4}$ miles a-day. How many miles did the first man (whose rate was five miles a-day) travel?

8. A person pays $432 for the insurance of goods, at $3\frac{3}{4}$ per cent. ; and he finds that if the goods are lost, he will receive from the insurance company the value of the goods, the premium of insurance, and $40 besides. Find the value of the goods.

9. I borrow $4,500, agreeing to pay principal and interest in four equal annual instalments. Find the annual payment, interest being calculated at six per cent.

10. (1) The length of a block of marble, containing 105 cubic inches, is 7 inches, find the length of a similar block containing 22,680 cubic inches.

    (2) A cone, whose slant height is 18 inches, and the circumference of whose base is 30 inches, is divided into two equal parts by a plane parallel at the base ; find the height of the frustrum.

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No. 22.

EDUCATION.

TIME—ONE HOUR AND A HALF.

1. Describe a school-house to answer the requirements of a School with an average attendance of 50 pupils, as to (*a*) size, (*b*) furniture.

2. Upon what would you chiefly depend, to secure order in School ?

3. Give an outline of any work on Education which you may have read, and express your opinion of it.

4. What are the leading differences that a judicious teacher will observe in his training of boys and girls respectively ?

5. Draw up a form of a monthly Report to parents.

6. How would you seek to promote an intelligent interest in Natural Science among your pupils ?

7. State the arguments for and against the giving of prizes, and give the result of your own observation and experience on the subject.

8. How would you explain to a class the difference between Vulgar and Decimal Fractions ? Give 12 questions of the kind you would put to a class in order to test their knowledge of this subject.

9. State what you know of the Educational labours of Pestalozzi.

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No. 23.

SCHOOL-LAW.

TIME.—ONE HOUR AND A HALF.

1. Under what circumstances may a Township Board of Trustees be formed, and how are such Trustees to be chosen?

2. What are the duties of Rural School Trustees in regard to—
   (*a*) Obtaining School Moneys.
   (*b*) The Compulsory Attendance of absentee children?

3. What formalities are necessary for procuring or changing a school site?

4. What is required of Trustees in regard to the holding of the Annual School Meeting?

5. Enumerate the specific duties of a Public School Teacher.

6. Under what circumstances is an Inspector empowered (*a*) to suspend, and (*b*) to grant a certificate?

7. Specify the duties of the County Inspector as to—
   (*a*) Apportioning the School Fund.
   (*b*) Visiting Schools.
   (*c*) Settlement of complaints and differences.

8. What does the law require of the Township Clerk in regard to—
   (*a*) The Trustees,
   (*b*) The Inspector?

9. Explain accurately the terms "Public School Fund," "Public School Section," "Public School Teacher."

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No. 24.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

“ It grew and grew
From the pine-trees gathering a sombre hue,
Till it seems a mere *murmur out of* the vast
Norwegian forests of the past ;
And it grew *itself like* a true northern pine,
First a little slender *line*,
Like a mermaid’s green eyelash, *and then anon*
A stem *that* a tower might rest upon,
Standing spear-straight in the waist-deep moss,
Its long *roots* clutching around and across,
As if they would tear up earth’s heart in their grasp
Ere the storm should uproot them or make them unclasp.”
—J. R. LOWELL : *The Growth of the Legend.*

1. Parse the thirteen italicized words.

2. Divide the extract into propositions, state their connection, and analyse them.

3. Give the derivation of ‘comfort,’ ‘epitaph,’ ‘paper,’ ‘executor,’ ‘save,’ ‘depose,’ ‘model,’ ‘serve,’ ‘paste,’ and ‘cover.’

4. Mention English words related in derivation to ‘speak,’ ‘sorrow,’ ‘choose,’ ‘what,’ ‘bequeath,’ ‘death,’ and ‘barren.’

5. Give examples of the different cases which may arise in the application of the principle, ‘A verb must agree with its nominative in number and person,’ and state the special rule applicable to each case.

6. Give the best definition of gender you know, state why you consider it the best, and point out its defects.

7. Correct or justify the following, adding in each case your reason :—

‘Every thought and feeling are opposed to it.’
‘It was thought to be he.’
‘Good order and not mean savings produce great profit.’
‘He is arrived.’
‘The chief magistrate is styled a president.’
‘I am writing in the same room with an itinerant dentist.’

8. Scan the following lines, naming the feet that occur :—

‘The proper study of mankind is man.’
‘Not a drum was heard, not a funeral note.’

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No. 25.

GEOGRAPHY.

Time—Two Hours.

1. Define briefly the terms : *Palæozoic*, *Silurian*, and *Oolitic* ; and explain what is meant by the following : " With the chalk, we close, as it were, one great volume of animated creation."

2. What hypothesis is involved in the expression " The Glacial Epoch," and what phenomena are usually explained by that hypothesis ?

3. State, and illustrate by diagrams and otherwise, Kepler's Laws of Planetary Motion.

4. Enumerate the Australian colonies : give their capitals, relative position, and chief productions.

5. What do you understand by Physical Geography ? What topics, for example, would the physical Geography of the Maritime Provinces embrace ?

6. Name the form of government, chief towns, and chief exports of Egypt, Syria, Thibet, Peru, Cuba, Sicily, Assam, and the Ionian Islands.

7. Name the localities of the cotton, woollen, linen, hardware, and earthenware manufactures in Great Britain and Ireland, and mention the most important towns in each district.

8. Define, as closely as possible, the position of the following, and state for what each is remarkable :—Moville, Dundee, Bristol, Strasbourg, Potsdam, Innspruck, Belgrade, Sadowa, Coomassie, Pittsburg, Funchal, Port Mahon, Jena, Tilsit, Fontainebleau.

9. Draw a map of that part of British America which lies north of Ontario and Quebec.

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No. 26.

ENGLISH LITERATURE.

TIME--One Hour and a Quarter.

1. Sketch the literary careers of Shakspeare and Addison.

2. Who were the authors of "Night Thoughts," "The Merchant of Venice," "The Complete Angler, "The Seasons," "The Deserted Village," and "The Lady of the Lake?" Describe the plan of any one of them.

3. Name the principal historical writers of the eighteenth and nineteenth centuries.

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No. 27.

EUCLID.

TIME.—THREE HOURS.

1. In equal circles, equal straight lines cut off equal circumferences, the greater equal to the greater, and the less to the less.

2. To describe a circle about a given equilateral and equiangular pentagon.

3. To find a mean proportional between two given straight lines.

4. What is meant by duplicate ratio? Write down two whole numbers, which are in the duplicate ratio of $\frac{1}{2}$ to $\frac{1}{3}$.
What are similar rectilineal figures?
Similar triangles are to one another in the duplicate ratio of their homologous sides.

5. In any right angled triangle, any rectilineal figure described on the side subtending the right angle is equal to the similar and similarly described figures on the sides containing the right angle.

6. To describe a triangle, of which the base, the vertical angle, and the sum of the two sides are given.

7. Form A the vertex of a triangle ABC, in which each of the angles ABC and ACB is less than a right angle, AD is let fall perpendicular on the base BC. Produce BC to E, making CE equal to AD; and let F be a point in AC, such that the triangle BFE is equal to the triangle ABC. Prove that F is one of the angular points of a square inscribed in the triangle ABC, with one of its sides on BC.

8. Let E be the point of intersection of the diagonals of a quadrilateral figure ABCD, of which any two opposite angles are together equal to two right angles. Produce BC to G, making CG equal to EA; and produce AD to F, making DF equal to BE. Prove that if EG and EF be joined, the triangles EDF and ECG are equal to one another.

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No. 28.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1. Explain briefly what is meant by the terms *Franklin*, *The English Pale*, *Investiture*, *Impeachment*.
2. "It was not until the time of Edward III. that England began to recover from the shock of the Norman conquest." Show this to be true.
3. Give an account of the rise of the "middle class" in England.
4. State briefly when the following persons lived, and for what they were remarkable:—Sir Thomas More, Hubert de Burgh, Erasmus, Dr. Sacheverel, Sir William Temple, Lord Bolingbroke.
5. Trace the changes which the language spoken by the people of England has undergone since the Conquest.
6. Give a brief sketch of the reign of Charles II.
7. Write short explanatory notes on The Mad Parliament, Tyrone's rebellion, The battle of Naseby, The battle of Cape la Hogue.
8. What battles followed the invasion of Greece by Darius and Xerxes? Give the dates.
9. State what you know of the following persons:—The two Scipios, Belisarius, Charlemagne, Mahomet.
10. Give a brief account of Sir W. Phipps' expedition against Quebec, and its results.
11. Mention in order, with dates, the principal constitutional changes in Canada since its cession by France.

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No. 29.

ENGLISH COMPOSITION.

TIME—One Hour.

Any one of the following subjects may be taken :—

The Ashantee War.

" The worst misfortunes in life are those that never come to us."

The importance of a knowledge of Chemistry.

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No. 30.

ALGEBRA.

TIME—THREE HOURS.

1. Solve the following :—

$$(a).\quad 11x^2-3xy+y^2=21,\qquad x^2-7xy=15.$$

$$(b).\quad \sqrt{}(2x^2-3x-1)=6x^2-9x-5.$$

$$(c).\quad (x-a)^{\frac{1}{3}}-(x+a)^{\frac{1}{3}}=a^{\frac{1}{3}}.$$

2. Find in how many ways a sum of eighty pounds sterling may be paid in pounds sterling and guineas.

3. A watch, which indicates true time at noon, is gaining uniformly, but when it indicates 6 o'clock, p.m. it meets with an accident, in consequence of which it afterwards goes uniformly at such a rate as to lose in the hour exactly as much as it formerly gained in the hour. When it indicates midnight it is $12\left(\frac{60}{3600+1}\right)\left(\frac{60}{3600-1}\right)$ seconds slow. What was its rate before the accident?

4. If the equations, $x^2+mx+2=0$, and $x^2+nx+1=0$, have a common root, find n in terms of m.

5. Inquire what value must be assigned to m, in order that the sum of the roots of the equation, $x^2+mx+4=0$, the sum of the squares of the roots, and the sum of the cubes of the roots, may be in geometrical progression.

6. Investigate a rule for finding the sum of a geometrical series, when the first term, the common ratio, and the number of the terms are known. The sum of the first 8 terms of a geometrical series is 10 times the sum of the first 4 terms; and the first term is unity. Find all the real forms of the series.

7. A party of men, and half as many boys, are employed together on a piece of work which they can finish in a certain number of days; 2 men doing as much work in a given time as 5 boys. After they have been at work for some time, 10 men and 10 boys are withdrawn from the work, in consequence of which the piece of work is 7 days longer of being completed than it would otherwise have been. If, after the 10 men and 10 boys were withdrawn, each of the remaining boys had done a man's work, instead of merely a boy's, the work would have been completed $3\frac{3}{5}$ days sooner than it actually was finished. Find how many men and boys respectively were employed on the work at first.

8. Let the expansions of $(1+x)^m$ and $(1+x)^{m+1}$, by the Binomial Theorem, which may be assumed, be—

$$(1+x)^m=1+mx+\ldots\ldots+ax^t+bx^{t+1}+\&c.$$
$$(1+x)^{m+1}=1+\ldots\ldots\ldots\ldots\ldots\ldots+cx^{t+1}+\&c.$$

Prove that $a+b=c$.

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No. 31.

CHEMISTRY.

Time—Two Hours.

1. Describe how pure nitrogen may be prepared, and give an account of the properties of that substance. In what cases may it be made to unite *directly* with other elements, and what are the products to which it gives rise in these several cases? What is the most characteristic property of nitrogen dioxide? For what purpose is this property made use of?

2. State generally the composition of the atmosphere. How many *litres* of dry atmospheric air at 740 *millimetres* pressure and 15° C. temperature, are required to burn completely one *litre* of olepant gas at the same temperature and pressure, and what is the weight of carbon dioxide, and of water produced by the combustion? [One gramme of hydrogen, at 760 mm. pressure and 0° C. temperature, occupies a space of 11.19 litres.]

3. How may an aqueous solution of ammonia be formed from chloride of ammonium? Describe the process, and represent the chemical action by means of an equation.

4. How is carbonic acid made? Give the equations representing the reaction. Describe fully what takes place when a stream of carbonic acid gas is passed into lime water to saturation; also what occurs when the liquid so produced is boiled. How would you prove that carbonic acid really consists of carbon and oxygen in the proportion stated in the formula?

5. Describe the manufacture of sulphuric acid.

   A vitriol-maker prepares ten tons of vitriol of specific 1·4, containing 80 per cent. of acid: how many tons of pyrites containing 40 per cent. of sulphur must for this purpose be burnt? Suppose 5 per cent. of the theoretical yield of sulphur remained unburnt in the pyrites, what would be the difference in the production of the sulphuric acid?

6. A few grains of white arsenic are put into an ounce or two of soup, state as fully as you can how you would proceed to detect its presence there?

7. What are the sources of iodine? How is it prepared? Describe the properties of iodine. How would you proceed to detect the presence of a soluble (*a*) chloride, (*b*) iodide, (*c*) fluoride, present single in a liquid?

8. Classify the common metals according to their equivalency. Give the formula of the characteristic oxide, chloride, and sulphide of each.

9. What is the most important ore of tin, and how is the metal extracted therefrom? How is the presence of tin in a solution detected?

10. Give an outline of the Atomic Theory.

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No. 32.

BOOK-KEEPING.

TIME.—One Hour and a Quarter.

1. Exhibit correct forms of Promissory Note, Draft, and Bill of Exchange

2. Journalize the following:

Toronto, January 1st, 1874, I have on hand, Cash				$2000 00	
		Wine, 50 pipes, at $350		17500 00	
					19500 00
Feby.	1.	Sold Williamson & Co., for cash, 6 pipes, at $375		2250 00	
"	10.	Sold James Allen & Co., for cash, 10 pipes, at $377		3770 00	
March	12.	Bought of William Adams, for cash, 17 pipes, at $366		6222 00	
"	30.	Sold to Michael Sullivan & Co., for cash, 50 pipes, at $375		18750 00	
April	2.	Bought for cash, from Joseph Staunton, 37 pipes, at $375		13875 00	
"	15.	Sold for cash, to James Allen & Co., 3 pipes at $406		1218 00	
May	5.	Sold for cash, to Charles Thompson, 1 pipe, at $410		410 00	
"	26.	Sold to Anderson & Co., for cash, 5 pipes, at $320		1600 00	
June	16.	Bought of William Adams, for cash, 18 pipes, at $325		5850 00	
		5 do. 355		1775 00	
"	18.	Sold Thomas Brett, for cash, 2 pipes, at $365		730 00	
"	30.	Sold to M. Sullivan & Co., for cash, 10 pipes, at $345		3450 00	
		7 do. 375		2625 00	
July	1.	Took Stock, and found on hand, cash	$9081 00		
		Wine, 20 pipes, at $350	7000 00		
		Do. 13 do. 365	4745 00		

3. Open Ledger Accounts, and properly post the above transactions.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

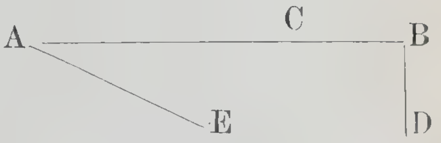
1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 27TH JULY, 1874.

No. 33.

NATURAL PHILOSOPHY.

TIME—THREE HOURS.

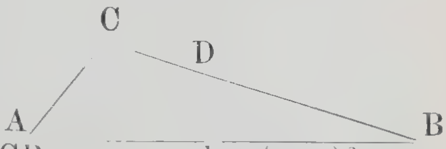


Statics. 1. A uniform heavy rod AB, whose weight is 20 lbs, is kept at rest in a horizontal position by four forces (in addition to its own weight): a force of 10lbs. acting at B in a direction BD at right angles to AB; a force of 10lbs acting at A in a direction AE which is such that EAC is $\frac{1}{3}$ of a right angle; a force m acting vertically at C; and a force n acting horizontally at B. If AC = 2CB, find m & n.

2. On AB, an inclined plane, whose base is AC, and which has the angle BAC equal to $\frac{2}{3}$ of a right angle, a heavy body is kept at rest by two equal forces, the one acting in the direction of AB, and the other in a direction parallel to AC and *towards the plane.* Prove that the reaction of the plane on the body is equal to the weight of the body.

3. Let ABCD, a uniform heavy square, be suspended by a string EB from a point E; and from A and C let weights P and Q be suspended by strings AP and CQ. Prove, that, if P exceed the weight of the square by 3Q, the direction of the string EB will bisect the line drawn from A to the centre of the square.

Dynamics. 4. A particle is shot vertically upwards in the direction AB from a point A on the earth's surface, its initial velocity being 384 feet in the second. Two seconds afterwards, another particle is let fall from B. When the particles come into collision, their velocities are equal. Find the length of AB.



5. Let ACB be a double inclined plane. When a heavy particle, descending along CB from rest at C, under the influence of the force of gravity, has reached D, another begins to descend along CA from rest at C, under the influence of the force of gravity. The particles arrive at B and A at the same time, AB being horizontal. If AC $= x$, CD $= y$, and CB $= z$, prove that $(z-x)^2 = yz$.

6. A particle is projected from A, with a velocity of 320 feet in the second, and in a direction which makes an angle of 30 degrees with the horizontal line AB. If it had been allowed to continue its flight it would have struck the ground at B; AB being thus its horizontal range. But, 4 seconds after it left A, another particle was projected from B, with a velocity of 320 feet in the second, and in a direction making with BA an angle of 30 degrees, so that its path is exactly that of the former particle reversed. If C be the point where the particles come into collision, find the vertical height of C above AB.

Pneumatics and Hydrostatics. 7. There are two liquids, whose specific gravities are in the proportion of $1000t+1$ to $1000t-1$. When immersed in the former, a body weighs one ounce less, and when immersed in the latter, it weighs one ounce more, than when immersed in water. Prove that the content of the body is t cubic feet. (See *Note.*)

8. A hollow conical vessel, open at the mouth, is sunk in a liquid, with its mouth downwards, and its axis vertical, to such a depth that the vertex of the cone is coincident with the surface of the liquid. The air contained in the upper part of the vessel would exactly fill the vessel under a pressure (15lbs. to the square inch) equal to that of the free external air. The vertical height to which the liquid has risen within the vessel is 7 inches; while the vertical height of the cone is 7 feet 7 inches. Find the specific gravity of the liquid, the the sp. gr. of water being 1. (See *Note.*)

Note. The weight of a cubic foot of water is 1000 oz.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 27th JULY, 1874.

No. 34.

BOTANY AND AGRICULTURAL CHEMISTRY.

TIME—One Hour and a Half.

1. What are the functions of leaves in plants?
2. Mention the principal cultivated plants belonging to the Rose Family; give its distinguishing characters; and botanically name and describe any wild plant you know belonging to it.
3. Define *Class*, *Order*, *Genus*, and *Species*, and explain the terms *syngenesious*, *monadelphous*, *capsule*, and *radicle*.
4. Explain the constitution of the fruit of the strawberry.
5. Draw a crenate leaf, a pinnately lobed leaf, a raceme, and a spadix with its spathe.
6. Describe sodium and calcium; give the chemical composition of their principal compounds; and explain their value as constituents of soils.
7. Write notes on points to be attended to in the cultivation of beets, oats, and clover.
8. Describe the process of making cheese, and state the action of the rennet on the different constituents of the milk.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 27th JULY, 1874.

No. 35.

ZOOLOGY AND PHYSIOLOGY.

TIME.—ONE HOUR AND A HALF.

1. Give an account of the distinctive characters and chief peculiarities of the *Amphibia*.

2. What are the distinctive characters of the class *Aves?*
In what respects do a humming bird, an ostrich, and a penguin differ?

3. Compare the modes of respiration and the respiratory organs in Mammals and Reptiles.

4. What variations are to be observed in the metamorphoses of insects?

5. Fully describe the knee-joint in a human being.

6. Give an account of the anatomy and physiology of the vocal organs.

7. Exhibit by a diagram the course of the rays of light in passing from an object to the retina.

8. Give a full account of the constitution and mode of action of the muscles.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 27th JULY, 1874.

No 36.

PHYSICS.

TIME.—TWO HOURS.

1. How would you cool a mixture in the absence of ice or snow ? Give the theory of your process.

2. Describe the relation of the heat *spectrum* to the light spectrum.

3. What is the "Thermal unit" generally adopted ? A pound of mercury at a temperature 102° C. is immersed in a pound of water at 40° C., how many degrees will the temperature of the water be raised, taking the Specific heat of mercury at ·03 ?

4. Apply the laws of reflexion of light to find the apparent position of a luminous point seen by reflection in a plane mirror.

5. If a small object on the principal axis of a concave mirror is gradually moved up to the mirror from a point at a considerable distance, shew what will be the simultaneous changes in the position and size of the image.

6. Explain by a diagram the compound microscope.

7. Describe an experiment to illustrate electrical induction. What is the phenomena known as the "return shock" ? Explain it.

8. If the point of a fine needle in metallic connection with the prime conductor of an electrical machine in action, be brought near a candle, the light will probably be extinguished. Explain clearly the cause of this.

9. Describe in general terms a Magneto-Electric Machine.

10. If a plate of zinc and one of copper be placed in dilute sulphuric acid, and connected by a silver wire outside the acid, describe the action, both chemical and electrical, that ensues.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd and 3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20TH JULY, 1874.

ANSWERS TO QUESTIONS.

ALGEBRA.

SECOND CLASS.

1. 1.
2. $\frac{3x-2y}{3x^2-5xy-y^2}$.
3. $x=-\frac{17}{19}$.
4. $x=3$.
5. $x=\frac{5\quad m}{3}$.
   $y=1$.
6. $x=3$.
   $y=-1$.
8. \$4000.
9. (*b*). $\frac{14}{27}$.
10. Remainder in first case, -1; second, -119.

NATURAL PHILOSOPHY.

SECOND CLASS.

1. 40 lbs.
4. 12 feet.
6. 29.52.
8. 10.
9. $m=300$.

ARITHMETIC.

THIRD CLASS.

(1). $3\frac{1}{2}$.

(2). 24003 oz., 2997 oz.

(3). \$33.60, \$24, \$14.40.

(4). \$16800.

(5). $16\frac{1}{2}$ feet.

(6). $22\frac{1}{2}$ days.

(7). \$39. 46125.

(8). \$60000.

(9). \$108 loss.

(10). $58\frac{4}{17}$ per cent.

ARITHMETIC.

SECOND CLASS.

1. $\frac{86}{1251}$.
2. 200.
3. 100.
4. $83\frac{1}{3}$ cents.
5. Given.
6. \$400.
7. \$3570, \$3520.
8. \$26666 $66\frac{2}{3}$.
9. \$16 $92\frac{4}{13}$.
10. 300.
11. £1666 13*s*. 4*d*.
12. 10, 15, 20.

PROVINCE OF ONTARIO.

Department of Public Instruction.

PUBLIC SCHOOL TEACHERS' EXAMINATION, JULY, 1874.

EXTRACTS FROM THE OFFICIAL REGULATIONS.

Time and Place of each Examination.—The yearly examination of candidates for Second and Third Class Certificates shall be held in each County Town in such building as may be appointed by the Inspector, who shall give at least three weeks' public notice thereof, in such manner as he shall deem expedient. The examination of candidates for First-Class Certificates shall be held at the same place [at the time mentioned below]; but all candidates for First-Class Certificates, who do not already possess Second-Class Provincial Certificates, shall be required to previously pass the examination for such Second-Class Certificate. No person is eligible to be a candidate for a Second-Class Certificate, unless he shall have previously obtained a Third-Class Certificate under the present system of examination, or a First or Second-Class Certificate under the former system.

Proceedings at each Examination.—The Inspector shall preside at the opening of each examination; and at the hour specified on the first day, and in the presence of such of his colleagues as may be there, and of the candidates, he shall break the seal of the package of examination papers received for that examination from the Education Department. He shall also break open the seal of each additional packet of examination papers as required, in the presence of a co-examiner and of the candidates. He shall further see that at least one examiner is present during the whole time of the examination, in each room occupied by the candidates. He shall, if desirable, appoint one or more of his co-examiners (1) to preside at the examination in any of the subjects named in the programme; (2) to read and report upon the answers as they are received.

Days and Hours of Examination for Second and Third-Class Certificates of Qualification for Public School Teachers, commencing 20th July, 1874.

		CLASS II.	CLASS III.
MONDAY, 20th July	2—4.30 P.M.	(1) Zoology, Botany and Agriculture. (Special Paper.)	
TUESDAY, 21st July	9—12 NOON 1.30—3.30 P.M. 3.45—5 P.M.	(2) English Grammar and Etymology. (3) Geography. (4) Book-keeping.	(15) English Grammar and Etymology. (16) Geography.
WEDNESDAY, 22nd July	9—12 NOON 1.30—4 P.M. 4.15—5 P.M.	(5) Arithmetic and Mensuration. (6) Education and School Law. (7) Dictation.	(17) Arithmetic and Mensuration. (18) Education and School Law. (7) Dictation.
THURSDAY, 23rd July	9—11.45 A.M. 1.30—3.45 P.M. 4 5 P.M.	(8) Euclid. (9) History. (10) Composition.	(19) History. (20) Composition.
FRIDAY, 24th July	9—12 NOON 1.30—4.30 P.M.	(11) Algebra. (12) Natural Philosophy.	
SATURDAY, 25th July	9—11.30 A.M. 1—3 P.M.	(13) Music and Drawing. (14) Chemistry, Botany and Physiology.	

NOTE.—The Examiners will make such arrangements for Reading and Writing as may seem to them most convenient.

Days and Hours of Examination for First-Class Certificates of Qualification for Public School Teachers, commencing 27th July, 1874.

CLASS I.

MONDAY, 27th July	9—12 NOON	(21) Arithmetic and Mensuration.	1.30—3 P.M. 3.15—4.45 P.M.	(22) Education. (23) School Law.
TUESDAY, 28th July	9—12 NOON	(24) English Grammar and Etymology.	1.30—3.30 P.M. 3.45—P P.M.	(25) Geography. (26) English Literature.
WEDNESDAY, 29th July	9—12 NOON	(27) Euclid.	1.30—3.45 P.M. 4—5 P.M.	(28) History. (29) Composition.
THURSDAY, 30th July	9—12 NOON	(30) Algebra.	1.30—3.30 P.M. 3.45—5 P.M.	(31) Chemistry. (32) Book-keeping.
FRIDAY, 31st July	9—12 NOON	(33) Natural Philosophy.	1.30—3 P.M. 3.15—4.45 P.M.	(34) Botany and Agriculture. (35) Zoology and Physiology.
SATURDAY, 1st August	9—11 A.M.	(36) Physics.		

EDUCATION OFFICE,
TORONTO, *June*, 1874.

PROVINCE OF ONTARIO.

EXAMINATION FOR SECOND CLASS PROVINCIAL AND THIRD CLASS COUNTY CERTIFICATES—JULY, 1874.

Values assigned by the Central Committee of Examiners.

See "General Regulations respecting the Examination of Candidates," &c., Nos. 7 and 8.

	Questions		1	2	3	4	5	6	7	8	9	Total
(14) CHEMISTRY, BOTANY & PHYSIOLOGY	Number of marks for perfect answers		24	22	24	22	23	18	23	22	22	200

	Questions		1	2	3	4	5	6	7	8	9	Total.
(2) (15) ENGLISH GRAMMAR & ETYMOLOGY	Number of marks for perfect answers	(Second Class)	48	48	25	30	21	48	30			250
		(Third Class)	40	40	24	10	18	24	14	16	14	200

	Questions		1	2	3	4	5	6	7	8	9	10	11	Total.
(5) (17) ARITHMETIC & MENSURATION	Number of marks for perfect answers	(Second Class)	19	19	18	20	16	20	20	20	19	16	20	225
		(Third Class)	15	20	25	15	20	25	15	20	25	20	...	200

	Questions		1	2	3	4	5	6	7	8	9	Total.
(6) EDUCATION & SCHOOL LAW	Number of marks for perfect answers	(Second Class)	15	23	18	20	24	20	15	18	22	175

	Questions		1	2	3	4	5	6	7	8	Total.
(18) EDUCATION & SCHOOL LAW	Number of marks for perfect answers	(Third Class)	20	20	20	24	11	15	20	20	150

(7) READING & DICTATION*.. 75 marks to be given for a satisfactory exercise in each of these subjects; that is, 75 marks for each.

	Questions		1	2	3	4	5	6	7	8	9	10	Total.
(9) (19) HISTORY	Number of marks for perfect answers	(Second Class)	10	20	12	20	15	8	15	10	28	12	150
		(Third Class)	10	12	15	16	12	18	10	16	21	20	150

	Questions		1	2	3	4	5	6	7	8	9	10	11	Total.
(3) (16) GEOGRAPHY	Number of marks for perfect answers	(Second Class)	20	12	21	24	15	10	10	15	10	13		150
		(Third Class)	14	10	10	8	12	10	16	10	15	15	30	150

	Questions	1	2	3	4	5	6	7	8	Total.
(13) MUSIC	Number of marks for perfect answers	5	3	2	3	1	4	4	5	30

(13) DRAWING.. Value of each question, 4. Total value of the paper, 20.

	Questions	1	2	3	4	5	6	7	8	9	10	11	Total value of first seven questions.	Total value of last eight questions.
(8) EUCLID	Number of marks for perfect answers	18	17	21	21	20	24	24	21	21	21	23	145	175

	Questions	1	2	3	4	5	6	7	8	9	10	Total.
(12) NATURAL PHILOSOPHY..	Number of marks for perfect answers	17	17	18	17	17	17	21	17	17	17	175

	Questions	1	2	3	4	5	6	7	Total.
(4) BOOK-KEEPING	Number of marks for perfect answers	8	8	8	8	8	25	35	100

	Questions	1	2	3	4	5	6	7	8	9	10	Total.
(11) ALGEBRA	Number of marks for perfect answers	16	16	16	17	17	17	17	17	25	17	175

(20) COMPOSITION & WRITING 75 marks to be given for a satisfactory exercise in each of these subjects; that is, 75 marks for each.

	Questions	1	2	3	4	5	6	7	8	9	Total.
(1) PAPER FOR SPECIAL CERTIFICATES IN NATURAL HISTORY, BOTANY AND AGRICULTURE	Number of marks for perfect answers	15	18	15	19	16	16	19	16	16	150

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* NOTE. To secure uniformity, as far as possible, in the manner of conducting the Examinations, it is recommended, that, in the ordinary papers, one mark be deducted for each instance of bad spelling, and that, in the Dictation Paper, 5 marks be deducted for each of the first four misspelt words, 7 marks for each of the next four, and 9 marks for each of the next three. Thus, 11 misspelt words would destroy the paper.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 1.

ZOOLOGY, BOTANY AND AGRICULTURE.

SPECIAL PAPER.

TIME—ONE HOUR AND A HALF.

1. Explain the processes of Gemmation and Fission, and name the classes of the Animal Kingdom in which they occur.

2. Describe the Monotremata, and show that they are more closely related to the birds than any other mammals.

3. Name the classes of Mollusca.

4. Describe the Nightshade Family, and name the principal cultivated plants belonging to it.

5. Explain the terms Raceme, Akene, Embryo, Angiosperm, Peduncle, Chlorophyll, Panicle, Involucre and Diœcious.

6. To what Class Order and Genus do the Turnip, the Apple, the Pea, the Lily, and the Oak, respectively belong?

7. Write notes on the cultivation of Potatoes and Turnips.

8. What is the reason that a rotation of crops is advantageous?

9. What is the comparative value of the different kinds of barnyard manure?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 2.

ENGLISH GRAMMAR AND ETYMOLOGY.

Time—Three Hours.

" There is none but he
Whose being I do fear : and under him
My genius is rebuked ; as, it is said,
Mark Antony's was by Cæsar. He chid the sisters,
When first they put the name of king upon me,
And bade them speak to him ; then, prophet-like,
They hailed him father to a line of kings :
Upon my head they placed a fruitless crown,
And put a barren sceptre in my gripe,
Thence to be wrenched with an unlineal hand,
No son of mine succeeding."

Shakespeare : Macbeth, Act iii, Sc. 1.

1. Divide the passage from Shakespeare into propositions, state their kind and connection, and fully analyse the first three and the last three.

2. Parse 'there,' 'none,' 'but,' and 'he,' in l. 1 ; 'chid,' in l. 4 ; 'them,' and 'speak,' in l. 6 ; 'him,' and 'father,' in l. 7 ; and 'no,' 'son,' 'mine,' and 'succeeding,' in l. 11.

3. Give the derivation of 'none,' 'prophet,' 'line,' 'fruitless,' 'crown,' 'barren,' 'sceptre,' and 'succeeding.'

4. Enumerate the affixes denoting state, condition or quality, and give an example of each in combination.

5. Make a list of words derived from *lego*, including four from the Latin and four from the Greek verb.

6. Parse the italicized words in the following sentences :—

" Did 'religion,' when our translation was made, *mean godliness ?* "—*Trench.*

" Thus shall mankind his guardian care engage,
The promised *father* of a future age."—*Pope.*

" In Christian hearts O for a pagan zeal !
A needful but opprobrious *prayer !* "—*Young.*

" He is busy *thrashing.*"

7. Give instances of infinitives and infinitive phrases used as the object of a verb.

8. Give examples of the different constructions in which 'as' is used, and tell in which of them it may be replaced by 'that.'

9. Distinguish May I go ? from Can I go ?
Shall I go ? from Will I go ?
Were I to go ? from Was I to go ?
Would I have gone ? from Should I have gone ?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 3.

GEOGRAPHY.

TIME—TWO HOURS.

1. Enumerate the principal functions of the atmosphere.

2. What is the position of the earth's axis in reference to the plane of its orbit, and what are the chief consequences of that position?

3. Give the political divisions of Asia, also their capitals, and form of government.

4. Mention the chief products, manufactures, or exports, of Aleppo, Coventry, Lille, Cork, Mobile, Havana, Valparaiso, Smyrna.

5. Trace the course of the Danube, naming its tributaries, and the countries drained by it.

6. Sketch a map of Great Britain, marking the position of Southampton, Newcastle, Gloucester, Manchester, Aberdeen, and Glasgow; also of the Tweed, the Mersey, the Clyde, and the Severn.

7. Give the capes and bays E. of N. America.

8. Describe the physical features of France.

9. What and where are Rhodes, Baikal, Carmel, Lassa, Spartivento, Alicante, Miquelon, Arno, Singapore, Tahiti, Nantucket, Messina, Maracaybo, Itasca, Trincomalee?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATE.

COMMENCING 19th JULY, 1875.

No. 4.

BOOK-KEEPING.

TIME—ONE HOUR AND A QUARTER.

1. What is a Trial Balance? When the Dr. and Cr. columns are equal, are the ledger accounts necessarily correct?

2. Describe the Stock $^a/_c$, the Profit and Loss $^a/_c$, and the Balance $^a/_c$.

3. Open ledger accounts for the following transactions, and close the accounts :—

January 1st, I have on hand, cash, $2,000 ; wine, 50 pipes, at $350 per pipe, $17,500. February 1st, sold Williamson & Co. for cash, 6 pipes wine at $375 ; February 10th, sold Jas. Allan & Co., for cash, 10 pipes wine, at $377. March 12th, bot. of Wm. Adams, for cash, 17 pipes of wine, at $366 ; March 30th, sold Michael Sullivan & Co., for cash, 50 pipes, at $375. April 2nd, bot. for cash from Joseph Staunton, 37 pipes, at $375 ; April 15th, sold for cash to Jas. Allen & Co., 3 pipes, at $406. May 5th, sold for cash to Chas. Thompson, 1 pipe, at $400. May 26th, sold for cash to Anderson & Co., 5 pipes, which had sustained injury, at $320. June 16th, bot. of Wm. Adams for cash, 18 pipes at $325, and 5 pipes at $355. June 18th, sold Thos. Butt for cash, 2 pipes, at $365 ; June 30th, sold Michael Sullivan & Co. for cash, 10 pipes, at $345, and 7 pipes, at $375. July 1st, took stock and found on hand—

Cash	$9,081
Wine, 20 pipes, at $350	7,000
" 13 " " $365	4,745

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 5.

ARITHMETIC.

TIME—THREE HOURS.

1. Capital originally invested so as to yield an annual income of \$22,500 at the rate of 9 %, is re-invested at 10 %, and then divided among three persons in shares which are as 4, 7 and 9. What is the yearly income of each?

2. If U. S. 6's 5-20 can be purchased at 107½ in currency, interest payable in gold, and Railway Bonds bearing 7 % interest payable in currency can be bought at 85 %, determine the respective rates of yearly interest yielded by these investments, assuming that the premium on gold is 25 %, and that the Railway Bonds are subject to a tax of 1½ %.

3. A merchant sells two qualities of flour, the superior at \$6 a barrel, the inferior at \$5 a barrel; in the month of April he sold 150 barrels, receiving therefor \$810. How many barrels of each kind did he sell?

4. If a merchant sells on credit to a retail grocer, on the 1st of November, goods to the amount of \$100; on the 6th, goods to the amount of \$225; on the 18th, goods to the amount of \$180; on the 22nd, goods to the amount of \$75; and on the 29th, goods to the amount of \$120. Find the equated time at which the whole debt for the month becomes due.

5. A man having bought a lot of goods for \$750, sells one-third at a loss of 4 %; by what increase per cent. must he raise that selling price, in order that by selling the rest at the increased rate, he may gain 4 % on the whole transaction?

6. The value of the paper required for papering a room, supposing it ¾ of a yd. wide, and 4½*d.* a yd., is £2 3*s.* 1½*d.*; what would be the cost if the paper was two feet wide, and 4*d.* a yard.

7. A New York merchant shipped to Liverpool 10,000 bushels of wheat which cost, delivered, \$2.15 in currency per bushel, he sold it for 7*s.* 6*d.* a bushel, and invested the proceeds in cottons at 8*d.* a yard, which, after paying an *advalorem* duty of 30 %, he sold at 30 cents a yard in currency. Determine his profits from these transactions, gold being at 37½ % premium.

8. If 36 men working 8 hours a day for 16 days, can dig a trench 72 yards long, 18 wide, and 12 deep; how many men will dig, in 24 days, a trench 64 yards long, 27 wide, and 18 deep?

9. A man sells 576 bushels of wheat at a profit of 8 %, and 296 bushels at a profit of 12 %; had he sold the whole at a uniform profit of 10 %, he would have received £2 14*s.* 3*d.* more than he actually did; what was the price per bushel paid for the wheat?

10. (*a*) The height of a tower on a river's bank is 50 feet, the length of a line from its top to the opposite bank is 65 feet; find the breadth of the river.

(*b*) The content of a cistern is the sum of two cubes whose edges are 10 inches and 12 inches respectively, and the area of its base is the difference of two squares whose sides are 1$\frac{1}{9}$ ft. and 1$\frac{2}{9}$ ft. respectively; find its depth.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 6.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS AND A HALF.

1. Distinguish and describe the different modes of questioning employed by approved teachers ; point out advantages and disadvantages attending each.

2. What relation does instruction bear to education? Shew the effect of each in forming the character of the child?

3. In what ways may the teacher best promote the moral development of his pupils?

4. What is meant by School Government? By what means may it be secured?

5. Enumerate the specific duties incumbent, by the Regulations, upon the Public School Teacher.

6. Describe the accommodation needed for a school of 150 pupils ; give the number of teachers, and the appliances required.

7. Construct a time-table for the lowest division of such a school.

8. Specify the duties of Public School Trustees in regard to (*a*) School Meetings, (*b*) Raising School Moneys, (*c*) Returns and Reports.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd AND 3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 7.

DICTATION AND READING.

N.B.—This paper is not to be seen by the Candidates.

DICTATION.

"The measures which he supported or opposed may divide the opinions of posterity, as they have divided those of the present age; but he will most certainly command the unanimous reverence of future generations by his pure sentiments towards the commonwealth; by his zeal for the civil and religious rights of all men; by his liberal principles favourable to mild government, to the unfettered exercise of the human faculties, and to the progressive civilization of mankind; by his ardent love for a country of which the well-being and greatness were indeed inseparable from his own glory; and by his profound reverence for that free constitution which he was universally admitted to understand better than any other man of his age, both in an exactly legal and in a comprehensively philosophical sense."

READING.

Fifth Reader, page 200:—

"The fame of this princess * * * * * * applause and approbation."

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 8.

EUCLID.

TIME—TWO HOURS AND THREE QUARTERS.

NOTE.—Those students who take only Book I, will confine themselves to the first seven questions. Those who take Books I and II, will omit the questions marked with an asterisk (*), namely, (1) and (2).

*1. If one side of a triangle be produced, the exterior angle is greater than either of the interior opposite angles.

*2. If two triangles have two angles of the one equal to two angles of the other, each to each, and one side equal to one side, namely, the sides opposite to equal angles, then shall the other sides be equal, each to each.

3. If a straight line falling on two other straight lines make the alternate angles equal to each other, these two straight lines shall be parallel.

4. If a straight line fall upon two parallel straight lines, it makes the two interior angles upon the same side together equal to two right angles.

5. Assuming Proposition XXXII, deduce the corollary: "all the exterior angles of any rectilineal figure, made by producing the sides successively in the same direction, are together equal to four right angles."

6. If a straight line, drawn parallel to the base of a triangle, bisect one of the sides, it shall bisect the other also.

7. Let ABC and ADC be two triangles on the same base AC and between the same parallels AC and BD. Prove, that, if the sides AB and BC be equal to one another, their sum is less than the sum of the sides AD and DC.

8. If a straight line be divided into any two parts, the rectangles contained by the whole and each of the parts are together equal to the square on the whole line.

9. If a straight line be bisected and produced to any point, the rectangles contained by the whole line thus produced, and the part of it produced, together with, &c. (6, ii).

10. Divide a straight line into two parts, such that the sum of their squares may be the least possible.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 9.

HISTORY.

Time—Two Hours and a Quarter.

1. Give some account of the explorations of Marquette and La Salle.

2. Under what sovereigns of England has the power of the crown been greatest? Give the reasons of your opinion.

3. What do you understand by "the Cabinet?"

4. What causes led to the dethronement of Richard II.?

5. How was Queen Anne related to her successor? Give a short sketch of her reign.

6. Distinguish the occasions on which Canada has been at war with her southern neighbours.

7. Explain what is meant by "The Invincible Armada," "Cromwell's Triers," "The Jacobites," "The Stamp Act," "The Repeal of the Corn Laws."

8. When did the following eminent personages live, and for what are they respectively famous? King Robert Bruce, The Chevalier Bayard, Sir Francis Bacon, Sir John Franklin, Dr. Edward Jenner?

9. Where are these places, and with what important historical events associated: Naseby, Flodden, Marathon, Arbela, Culloden, Zama, Pharsalia? Give the dates.

10. Describe any *one* of the events referred to in the last question.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 10.

ENGLISH COMPOSITION.

TIME—ONE HOUR.

Note—Each Candidate may choose any one of the the following subjects :—

1. A Winter Evening in Canada.
2. Spain.
3. Tobacco.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 11.

ALGEBRA.

TIME—THREE HOURS.

1. Find the continued product of the expressions, $a+b+c$, $c+a-b$, $b+c-a$, $a+b-c$.

2. Simplify $\dfrac{a^3+a^2b}{a^2b-b^3}-\dfrac{a\,(a-b)}{b\,(a+b)}-\dfrac{2\,a\,b}{a^2-b^2}$

3. Find the Lowest Common Multiple of $3\,x^2-2x-1$, and, $4\,x^3-2\,x^2-3\,x+1$.

4. Find the value of x from the equation, $ax-\dfrac{a^2-3bx}{a}-ab^2=bx+\dfrac{6bx-5a^2}{2a}-\dfrac{b\,x+4a}{4}$

5. Solve the simultaneous equations,

$$\frac{a}{x}+\frac{b}{y}=m,$$

$$\frac{c}{x}+\frac{d}{y}=n.$$

6. In the immediately preceding question, if a pupil should say, that, when $nb=md$, and $bc=ad$, the value of x, obtained in the ordinary method, has the form $\frac{0}{0}$, and that he does not know how to interpret such a result, what would you reply?

7. Two travellers set out on a journey, one with \$100, the other with \$48; they meet with robbers, who take from the first twice as much as they take from the second; and what remains with the first is 3 times that which remains with the second. How much money did each traveller lose?

8. A and B labour together on a piece of work for two days; and then B finishes the work by himself in 8 days; but A, with half of the assistance that B could render, would have finished the work in 6 days. In what time could each of them do the whole work alone?

9. P and Q are travelling along the same road in the same direction. At noon P, who goes at the rate of m miles an hour, is at a point A; while Q who goes at the rate of n miles in the hour, is at a point B, two miles in advance of A. When are they together?

   Has the answer a meaning, when $m-n$ is negative? Has it a meaning when $m=n$? If so, state what interpretation it must receive in these cases.

10. P is a number, of two digits, x being the left hand digit, and y the right. By inverting the digits, the number Q is obtained. Prove that $11\ (x+y)\ (P-Q)=9\ (x-y)\ (P+Q)$.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 12.

NATURAL PHILOSOPHY.

TIME—THREE HOURS.

1. A straight lever ACB, without weight, the fulcrum being C, is in equilibrium, in a horizontal position, under the influence of two weights, namely, P acting at A, and W at B. If $AC = 3\frac{1}{3}$ feet, and $BC = 4\frac{2}{3}$ feet, and if the pressure on the fulcrum be 24 lbs., find P and W.

2. Assuming the principle of Virtual Velocities, apply it to determine the mechanical efficiency $\left(\frac{W}{P}\right)$ of the Screw, the Power being supposed to act in a plane at right angles to the direction of the screw.

3. A weight W is kept at rest on an inclined plane by a power P acting parallel to the base. Does such a machine ever act a mechanical disadvantage? If so, when? Illustrate by an example.

4. If a pupil should say, that, in the case of a body at rest on an inclined plane under the influence of a Power P acting parallel to the plane, the weight of the body and the force P, being neither equal nor directly opposite, cannot possibly counterbalance one another; and should ask what force, additional to these, acts on the body so as to keep it at rest; what would you reply?

5. What is meant by the *Resultant* of a number of forces acting at a point?
   Draw any lines AB, BC, CD; and let a particle at A be acted on by forces parallel to the lines AB, BC, CD, taken in order, and represented by them in magnitude. Prove (assuming the principle of the Parallelogram of Forces) that the resultant of these three forces as represented in direction and magnitude by AD.

6. ABC is an equilateral triangle, of which the side is one foot. A particle at A is acted on by a force represented in magnitude and direction by AB. Let the force be resolved into two forces, one in a direction parallel to BC, the other in a direction perpendicular to BC. Find the lengths of the lines representing these forces respectively.

7. A hollow cylinder, whose height is 6 feet, while the radius of the base is 1 foot, is filled with water. Find the pressure of the water on the interior of the vessel, *first*, when the vessel stands on its base on a horizontal floor, and *secondly*, when it lies on its side on a horizontal floor. (The weight of a cubic foot of water is 1,000 ounces; and the solid content of a cylinder is found by multiplying the area of the base by the height.)

8. The height of the barometric column being 30 inches, find the pressure of the atmosphere on an area of one square foot, the sp. gr. of mercury being 13.6, and the weight of a cubic foot of water (sp. gr. = 1) 1,000 ounces.

*9. Describe the Air Pump.

*10. Describe the Syphon.

*11. Describe the Common Pump.

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* In describing these instruments, the candidate should bring clearly out the principles involved in their construction and use.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 13.

MUSIC.

Time— One Hour and a Quarter.

1. Write the Scale of E Major and B flat minor with their proper signatures, marking where the semitones fall, both ascending and descending.

2. Give the signs for simple triple time and the signification of each.

3. What characters are used to denote silence? Write one of each kind, with its name and value.

4. Write a bar of each kind of note in general use in $\frac{2}{4}$ time, marking how many should be counted to each.

5. What is the use of the leger lines, and name the notes on the first leger line above and below the treble and bass staves.

6. How can you tell in what key a piece of music is written?

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 14.

DRAWING.

Time—One Hour and a Quarter.

1. Draw a square and name the conditions necessary for its formation.

2. How does a rhombus differ from a square.

3. Draw a right angled triangle and name the sides.

4. Bisect a given line and erect a perpendicular by one operation.

5. Erect a perpendicular at the end of a given line.

6. Draw a Gothic arch and shew by construction lines how the arch stones radiate.

7. What is a decagon.

8. Give general rule for inscribing any given polygon in a circle.

9. Draw a regular hexagon.

10. Draw a heptagon.

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2nd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 19th JULY, 1875.

No. 15.

CHEMISTRY.

TIME—ONE HOUR.

the compounds of Oxygen and Nitrogen, and give the formula the molecular weight and the density of compound.

what conditions is the boiling-point of Water 212° F.? How may the actual temperature of boiling r be raised or lowered?

antity of Alcohol containing 12 pounds of Carbon and 3 pounds of Hydrogen were to undergo combustion, how many pounds of Carbon Dioxide and how many of Water would be formed?

element enters into the composition of every acid?

PROVINCE OF ONTARIO.

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2nd CLASS PROVINCIAL CERTIFICATE.

COMMENCING 19th JULY, 1875.

No. 16.

BOTANY.

TIME—ONE HOUR.

1. How are plants nourished before and after appearing above ground ?
2. Give an account of the various modes of propagating plants from buds.
3. Tell what you know about the various forms of the calyx and the corolla.
4. Explain the terms Cotyledon, Pinnate, Rootstock, Filament, and Radicle.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1875.

No. 18.

ENGLISH GRAMMAR AND ETYMOLOGY.

Time—Three Hours.

"*Under* a system *in which* political weight is perpetually regulated by the magnitude and importance of the community, *there is no reason* for *preserving* an arbitrary *limit prescribed* under an obsolete condition of things, and the nominal representation may be determined by, and correspond with, the real position of the electors."

Hare on Representation.

1. Divide the sentence into propositions, state their kind and connection, and analyse them.

2. Parse the ten italicized words.

3. Change the construction of the sentence by substituting for the verbs in the passive voice their active forms.

4. Give the meaning of the Latin prefixes which occur in the extract.

5. What is the force of the affixes *age*, *ry*, *ice*, *dom*, *ness*, *ock*, *ic*, *ose*, *ish*, and *en*. State in regard to each whether it is of Classical or Anglo-Saxon origin.

6. Explain the terms Declension, Conjugation, Case, Mood, Tense, and Participle, illustrating your answer with examples.

7. Form the past tense and the past participle of Rid, Rend, Shed, Dive, Lean, Light, Wed, and Speed.

8. Show by examples how a verb may be modified by a word, by a phrase, and by a subordinate sentence.

9. Correct the following sentences, and quote the rule of syntax transgressed in each case :—

"The chaplain entreated my comrade and I to dress as well as possible."

"This is just as if an eye or a foot should demand a salary for their service to the body."

"The mechanism of clocks and watches were totally unknown."

"In these kind of expressions some words seem to be understood."

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

3rd CLASS CERTIFICATES.

COMMENCING 20th JULY, 1875.

No. 19.

GEOGRAPHY.

TIME—TWO HOURS.

1. What are the causes of the seasons, and of the varying length of day and night?

2. Describe the Gulf Stream; and mention some of its effects.

3. Name and describe the course of the principal rivers that discharge (*a*) into the Black Sea; (*b*) into Lake Ontario.

4. Give the boundaries and physical features of Greece.

5. Name the states of the N. American Union on the Atlantic, with their capitals.

6. State as accurately as you can the position of C. Clear, Balkan Mts., I. of Wight, Bahama Is., C. Matapan, Long Id., C. Hatteras, C. Breton Id., Firth of Forth, Miramichi Bay, R. St. Maurice, R. Richelieu; also of Mt. Hooker, Mt. Cotopaxi, Mt. Blanc.

7. Draw a map of the Province of Ontario, marking the counties and chief rivers.

8. Where, and for what noted, are Liverpool, Saratoga, Birmingham, Belfast, Greenock, Hull, Florence, Prague, Havana, Martinique, Rio Janeiro, Toulon, Nice, Cronstadt?

9. Mark on your map of Ontario the principal towns of the western peninsula.

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3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1875.

No. 20.

ARITHMETIC.

TIME—THREE HOURS.

1. Simplify, $\left\{\dfrac{\frac{2}{3}+\frac{5}{6}+\frac{7}{8}+\frac{11}{12}}{\frac{3}{4}-\frac{5}{8}}\times\dfrac{1}{34\frac{1}{2}}\right\}\div\left\{\dfrac{7\frac{1}{2}}{6\frac{1}{2}}+\dfrac{11\frac{1}{2}-2\frac{2}{5}}{11\frac{1}{2}+2\frac{2}{5}}\times 10\tfrac{9}{13}-7\tfrac{1}{8}\right\}$

2. A Wine Merchant pays $175 for a hogshead of wine, and bottles it off into an equal number of quart, pint, and half-pint bottles: how many dozen of each has he, and at what must he sell it per dozen to gain $\frac{3}{20}$ of his outlay?

3. What must be the face of a note so that when discounted at a bank for 4 months and 9 days, at 9 per cent., it will give $240?

4. A, B and C having equal shares of a ship, sell respectively one-third, one-quarter, and one-fifth of their shares to D, who dies and leaves his share equally among them: If B's and C's interest in the ship be worth $37,300, what is the value of A's share?

5. A Farmer has 500 bushels of wheat; he can sell it at once for $1 20 a bushel; by storing it for six months at a cost of $20 paid in advance, he can realize $1 30 a bushel; he adopts the former course: determine how much he has gained or lost by so doing.

6. Express the value of $.8\dot{3}$ of 8*s*.$+.\dot{0}\dot{5}$ of 2 guineas$+1.8$ of 5*s*.

7. A Merchant bot. a number of barrels of flour for $1,800; he used 20 bbls. and sold $\frac{4}{5}$ of the remainder for $1568 which was $224 more than cost. How many barrels did he buy?

8. When gold is quoted at $133\frac{1}{3}$, what is the gold value of a $10 greenback?

9. A piece of land whose length is 151 yds. $1\frac{1}{4}$ ft., and breadth 35 yds., is to be exchanged for part of a strip of land of the same quality, whose breadth is 15 yds. $2\frac{1}{2}$ ft. Find the length of the equivalent strip.

10. What is the duty on 4 hogsheads of sugar each weighing 1,280 lbs., gross, at $2\frac{3}{4}$ cents a pound; tare 14 per cent

11. A Merchant in New York wishes to remit to London a bill of exchange for £293. 1*s*. 0*d*.; what is the cost of this bill when exchange is at $9\frac{1}{2}\%$ premium?

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3rd CLASS CERTIFICATES.

COMMENCING 20th JULY, 1875.

No. 21.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS AND A HALF.

1. What relation does Instruction bear to Education? Point out the function of each in forming the character of the child.

2. In what ways may the Teacher best promote the moral development of his pupils?

3. How would you deal with the following cases:
   (*a*) The class is inattentive.
   (*b*) Attendance is irregular.
   (*c*) Some of your pupils have been injured by excessive indulgence at home?

4. What is required in order to teach Arithmetic successfully? Give notes of a lesson on Subtraction.

5. What are the regulations in regard to the Teacher's absenting himself from his school?

6. What aims would you keep in view in preparing an object-lesson? Sketch such a lesson on "The Camel."

7. What duties do the Regulations require of Public School Teachers?

PROVINCE OF ONTARIO.

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3rd CLASS COUNTY CERTIFICATES.

COMMENCING 20th JULY, 1875.

No. 22.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1. Name the persons most distinguished in literature, war, or politics, who flourished in England during the reign of Elizabeth.

2. What causes involved England in war with Spain in the time of James I.? Give some account of that war.

3. How was Queen Anne related to her successor? What famous men adorned her reign?

4. Describe the condition of the English people under the early Norman Kings.

5. Give a brief sketch of the reign of King John.

6. Detail concisely the events which led to the battle of Waterloo. Give the date of the battle, and its results.

7. Say when the following persons lived, and for what each is famous: Dunstan, Sir Thomas More, Ben Jonson, William Penn, Dr. Edward Jenner, John Howard, George Stephenson.

8. Briefly describe the first settlement of Canada.

9. Where are the following places, and with what historical events are they connected: Stamford Bridge, Crecy, Naseby, Dunbar, Fontenoy, La Hogue, Trafalgar?

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3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1875.

No. 23.

ENGLISH COMPOSITION.

TIME—ONE HOUR.

Write a letter to a friend giving an account of the way in which you have spent the last six months.

PROVINCE OF ONTARIO.

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1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th JULY, 1875.

No. 24.

ARITHMETIC AND MENSURATION.

TIME—THREE HOURS.

1. On May the 1st, 1875, a banker discounts a note of \$600 at 8 %, and by so doing receives $8\frac{1}{2}$ % on his money. Find when the note was payable.

2. In an election of a member of parliament 10 % of the constituency refused to vote; of two candidates, one received 41 % of the votes of the whole constituency, and was elected by a majority of 80; find the number of votes cast for each.

3. A and B are employed upon a job for which they are to receive \$4. A begins work in the morning half an hour before B; and at noon the amount of work he has accomplished is greater than that of B by $\frac{1}{20}$ of the whole work to be done. They rest at noon for an hour. On resuming their labor, B works with diminished energy, while A goes on with the same efficiency as before. A stops working at 6 p.m.; and B, continuing to work alone, finishes the work at 7 p.m. If paid in proportion to the quantity of work each has done, how much do they severally receive?

4. Bought in London 2,000 yards of broadcloth at 15*s.* 9*d.* sterling a yard, and paid for it by bill of exchange. After paying 50 % ad valorem duty, at what price per yard in currency must it be sold in New York to make 25 per cent. currency on the purchase, exchange on London being $9\frac{1}{2}$%, and gold at a premium of 35 %.

5. A person invests \$200 at the end of each year, and at the end of the third year finds he is worth \$800; find the rate per cent. interest compound.

6. A person sells \$12,000 Canadian bank stock which pays half-yearly dividends at 4 %, at 112, and invests in American Railway stock at $98\frac{3}{4}$ currency. Gold being quoted at $112\frac{3}{4}$, (and Canadian currency considered equal to gold) what yearly dividend should the latter stock pay in order that the person's income may be unchanged?

7. A Canadian retail dealer buys from a Toronto wholesale merchant at an advance of 85 % on the latter's sterling cost, the English currency, after such advance, being converted into Canadian at 20 cents to the shilling. The retail dealer pays \$4.44 for a certain article: determine the wholesale merchant's gain per cent., allowing 75 cents for insurance, freight and customs, and taking exchange at $109\frac{1}{2}$, brokerage $\frac{1}{8}$ %.

8. A and B invest a certain sum of money in a business. A invests $66\frac{2}{3}$ of what B invests. At the end of seven months A withdraws 25 per cent. of his capital, and at the end of nine months B withdraws 25 per cent. of his. The profits at the end of the year are \$663: how should this sum be divided?

9. A railway train 44 yards long passes a man (A) travelling (in the same direction) at the rate of 6 miles an hour in 3 seconds. Half an hour after leaving A it meets another traveller (B) and passes him in $2\frac{1}{12}$ seconds. Determine the distance from the point where the train leaves A, at which A and B will meet.

10. (*a*) Fencing is worth 20 cents a yard, and the greatest amount of land that can be enclosed in rectangular form for a certain sum of money is 52*ac.* 173,156 *yds.* Find the cost of the fencing.

(*b*) If a spherical shell when formed into a solid sphere be equal in volume to its own cavity, find the thickness of the shell.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th JULY, 1875.

No. 25.

EDUCATION.

TIME—ONE HOUR AND A HALF.

1. "In order to the perfection of an art, it must be founded on a corresponding science; of nothing is this more true than of Education." What sciences underlie the art of education? Show that the teacher, to be successful, must have some knowledge of them.

2. What are the conditions essential to the proper teaching of Arithmetic?

3. Describe your method of teaching
   (*a*) The Fourth Reader.
   (*b*) History, to an advanced class.
   (*c*) English Composition.

4. "The matter of *the happiness of the young* has not yet received the attention it deserves in schemes of education." Discuss this statement.

5. Show how to organize a village school of 150 pupils; describe the accommodations, teaching staff, and appliances necessary under the Law and the Regulations.

6. Of the six hours daily devoted to school work, much is commonly wasted. Show how this waste of time may be reduced to a minimum.

7. What is discipline? Mention motives which you would think it right to cultivate in a child in order to secure his obedience.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE COUNCIL OF PUBLIC INSTRUCTION.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 26th JULY, 1875.

No. 26.

SCHOOL-LAW.

TIME—ONE HOUR AND A HALF.

1. Enumerate and describe the different kinds of schools that may be established by Boards of Trustees.

2. Give a summary of the powers of Boards of Trustees in regard to the site and school house.

3. Specify the duties of the Public School Inspector as to
   (*a*) Apportioning and paying the School Fund.
   (*b*) Suspending a Teacher's Certificate.
   (*c*) Attending arbitrations.

4. Distinguish the functions of County and Township Councils, respectively, in relation to Public Schools.

5. What advantages are expected to be derived from the substitution of Township for Section Boards?

6. Under what circumstances are Trustees *bound* to convene a meeting of the ratepayers?

7. What are the Regulations with regard to the Teacher's absenting himself from his School?

8. What protection does the law of Ontario give to parents in regard to the religious training of their children?

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No. 27.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

'The fault, dear Brutus, is not in our stars,
But in ourselves, that we are underlings.
Brutus and Cæsar: What should be in that Cæsar?
Why should that name be sounded more than yours?
Write them together, yours is as fair a name;
Sound them, it does become the mouth as well;
Weigh them, it is as heavy; conjure with them,
Brutus will start a spirit as soon as Cæsar.
Now in the names of all the gods at once,
Upon what meat does this our Cæsar feed,
That he has grown so great? Age, thou art shamed!
Rome, thou has lost the breed of noble bloods!
When went there by an age since the great flood,
But it was famed with more than with one man?
When could they say, till now, that talked of Rome,
That her wide walks encompassed but one man?
Now it is Rome indeed and room enough,
When there is in it but one only man.
O! you and I have heard our fathers say,
There was a Brutus once that would have brooked
The eternal devil to keep his state in Rome
As easily as a king."

Shakespeare: Julius Cæsar, Act I, sc. 2.

1. Point out all the subordinate sentences, and explain their relations.

2. Parse 'Brutus,' in l. 3; 'now,' 'in,' 'at,' and 'once,' in l. 9; 'great,' in l. 11; 'there,' and 'by,' in l. 13; 'now,' in l. 15; 'room,' and 'enough,' in l. 17; 'but,' and 'only,' in l. 18; 'fathers,' in l. 19; and 'king,' in l. 22.

3. Give the derivation of 'fault,' 'but,' 'that,' 'underling,' 'sound,' 'conjure,' 'spirit,' 'once,' 'age,' 'noble,' 'there,' 'fame,' 'than,' 'encompass,' 'indeed,' 'only,' and 'easily;' and trace the history of the meaning where you can.

4. Enumerate the meanings of 'dear,' 'fair,' 'sound,' 'become,' 'spirit,' and 'brook.'

5. 'But it was famed,' l. 14. Change the construction.

6. Scan the first line of the extract.

7. Name the other plays of Shakespeare founded on subjects taken from Roman History.

8. Some grammarians consider the article and the participle distinct parts of speech. State your own views, with reasons.

9. Discuss the grammar of these sentences:—

"O thou my voice inspire,
Who touched Isaiah's hallowed lips with fire."

"Ellipsis is when one or more words are wanting to complete the sense."

"Let us take care how we sin."

"This blunder is said actually to have occurred."

"An example or two are sufficient to illustrate the general principle."

"There is more than one fashionable dealer in old furniture in the west of London who habitually sells as old furniture, a great part of which is new."

10. "Orthographical expedients are resorted to on account of the imperfections of the English alphabet, which may be characterized as deficient, redundant, and ambiguous." —*Authorized Spelling Book.* Clearly explain the meaning of the term 'orthographical expedient,' and show in what respects the English alphabet is 'deficient, redundant, and ambiguous.'

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No. 28.

GEOGRAPHY.

Time—Two Hours.

1. In what different ways have mountains been formed? Give examples.

2. Describe the principal plateaux of Asia.

3. What are Cyclones? Give their characteristics.

4. How do you account for the difference of temperature in the N. and S. hemispheres?

5. Describe the physical features of Nova Scotia.

6. Enumerate the chief functions of the atmosphere.

7. Describe, as fully as you can, *one* of the following: Palestine, Greece, Brazil.

8. Draw a map of Europe, marking the political divisions and their capitals; also, the chief mountain ranges and rivers.

9. Where, and how politically related, are Cyprus, Aleppo, Curaçoa, Lombardy, Trinidad, Niphon, Bulgaria, Formosa, Zanzibar, Juan Fernandez?

10. Name the principal rivers of Ontario, and the counties watered by them.

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No. 29.

ENGLISH LITERATURE.

TIME— ONE HOUR AND A QUARTER.

1. Sketch the life and give an account of the literary work of Edmund Spenser, and of Francis Bacon.
2. Give a general view of the state of literature in the reign of Queen Anne, and point out the influences which gave that epoch its peculiar character.
3. Tell what you know about the Letters of Junius, the Task, the Excursion, and the Rime of the Ancient Mariner.

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No. 30.

EUCLID.

TIME—THREE HOURS.

1. If two triangles have two angles of the one equal to two angles of the other, each to each, and one side equal to one side, namely, the sides adjacent to the equal angles in each, then shall the other sides be equal each to each.

2. From a given circle to cut off a segment, which shall contain an angle equal to a given rectilineal angle.

3. If the angle of a triangle be divided into two equal angles by a straight line which also cuts the base, the segments of the base shall have the same ratio which the other sides of the triangles have to one another.

4. The sides about the equal angles of equi-angular triangles are proportionals; and those which are opposite to the equal angles are homologous sides.

5. If the similar rectilineal figures similarly described upon four straight lines be proportionals, those straight lines shall be proportionals.

6. Any rectangle is half the rectangle contained by the diameters of the squares on its adjacent sides.

7. Through a given point within a given circle, to draw a straight line such that one of the parts of it intercepted between that point and the circumference shall be double of the other.

8. If, from any point in a circular arc, perpendiculars be let fall on its bounding radii, the distance of their feet is invariable.

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No. 31.

HISTORY.

TIME—TWO HOURS AND A QUARTER.

1. Briefly narrate the circumstances which led to the union of the Canadas in 1840, and state the most important results of that measure.

2. Name the Sovereigns who were reigning in England at the close of each century, from the ninth to the eighteenth, successively.

3. Sketch the condition of the people of England under the Tudor Sovereigns.

4. Give some account of *one* of the following: The Declaration of Rights, the British Constitution, the Trial of the Seven Bishops.

5. Specify the most important reforms which have taken place in the administration of public justice in Great Britain since the time of the Normans. Give examples.

6. Sketch the *characters* of Charles I. and George III.

7. Write brief explanatory historical notes on the Abdication of Napoleon I., the War of Greek Independence, the Abolition of Slavery.

8. When did these persons live, and for what are they remarkable: Zenghis Khan, the Emperor Charles V., Charles the Bold, Richard Cromwell?

9. Give a short account of the battle of Thermopylæ.

10. Where and for what famous are Cunaxa, Mantinea, Zama, Pydna, Chaeronea, Pharsalia?

11. Describe concisely any *one* of the Expeditions of Alexander the Great.

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No. 32.

ENGLISH COMPOSITION.

TIME—ONE HOUR.

OTE.—Each candidate may choose any one of the following subjects.

1. Napoleon the Third.
2. The Newspaper.
3. " Life is but thought."

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No. 33.

ALGEBRA.

TIME—THREE HOURS.

1. Of the three equations,

$$x^2+mx+a^2=0,$$
$$x^2+mx+b^2=0,$$
$$x^2+mx+c^2=0,$$

the first has its roots real and equal, the second has its roots real and unequal, the third has its roots imaginary. Inquire what is the order of magnitude of the expressions, a^2, b^2, c^2.

2. Extract the square root of $a+\sqrt{(a^2-b^2-c^2+2\,b\,c)}$.

3. Solve the simultaneous equations,

$$xy=\frac{36}{7}\left(\frac{1}{xy}-1\right)$$
$$x-y=5.$$

4. Solve the simultaneous equations,

$$x^2+y^2+x+y=42$$
$$xy=15.$$

5. Find the roots of the equation, $x^4+1=0$, in the form, $a+b\sqrt{(-1)}$.

6. A, B, C, whose rates of walking are as m, n, p, set out from a place at equal intervals of time after each other, A being first and C last. After a time, they are observed to be at the same distances as when C started, but in reverse order, A being now last, and C first. Shew that n is the Harmonical mean between m and p.

7. Enquire whether the number of positive integral solutions of the equation $ax+by=c$, is limited, or not, a, b, and c being positive.

   Find the least number, which, when divided by 14 and 5, will leave remainders 1 and 3 respectively.

8. Investigate a method for finding the sum of an Arithmetical series, when the first term, the common difference, and the number of the terms, are known.

   If a, b, c, be the $(m-n)$th, the mth, and the $(m+n)$th terms of an Arithmetical progression, prove that

$$\frac{b^2}{b^2-ac}=\left(\frac{a+c}{a-c}\right)^2$$

9. Two travellers, P and Q, set out at noon, the former to go from A to C, the latter to go from C to A. The road passes through a village B. Owing to an accident, P, a short time after starting, suffers a detention of an hour and a half; then going forwards at the same rate as before, he passes through D, a station between A and B, at the same time that Q, who also travels at a uniform rate, different from that of P, passes through E, a station between C and B; and both travellers arrive together at B at 3 o.clock p.m. The distances CE, EB, BD, are in Harmonical Progression; while DA is a fourth proportional to them. Prove that 2EB = 3BD.

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No. 34.

CHEMISTRY.

TIME—TWO HOURS.

1. A watch spring is burned in a closed vessel of Oxygen, state—
   (1) Whether the weight of the bottle and its contents is affected by the combustion ?
   (2) What is the nature of the products formed by the combustion ?
   (3) Whether the whole of the oxygen originally present filing the bottle, is still present, and if so in what form ?

2. Flint is said to be a compound of silex, which, although it has no acid or sour taste, is also called silicic acid ; why is it so called ?

3. Under what conditions is carbonic oxide converted into carbonic acid, and carbonic acid into carbonic oxide ? explain the action of carbonic acid on plants in daytime and at night.

4. I pour hydrochloric acid upon some marble, iron and lime, each placed in a separate vessel with a little water. I perform a similar experiment with sulphuric acid and with nitric acid ; describe the result produced in each case.

5. Give some account of the manufacture of coal gas, mentioning the useful, the useless, and the hurtful products ; and the methods of removing the last.

6. How would you prove that the red substance produced by heating phosphorus in an atmosphere of carbonic acid at 240° c. is an allotropic modification of this element ?

7. Describe how Sir Humphrey Davy prepared the metals potassium and sodium. How would you distinguish a piece of barium from one of strontium. The atomic weight of potassium is 6.2, what is its specific heat ?

8. A solution of potassium chlorate was reduced to chloride and then precipitated by an excess of silver nitrate ; 7.275 grammes of silver chloride were obtained : what was the weight of the chlorate in the solution ?

9. A body yields by analysis 43.75 per cent. of nitrogen, 6.25 per cent. of hydrogen, and 50 per cent. of oxygen : what is its formula, name and use ?

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No. 35.

BOOK-KEEPING.

TIME—ONE HOUR AND A QUARTER.

1. What is the difference between Double Entry and Single Entry? "The opening or not opening of the Real Accounts in the Ledger constitutes the principal difference between the two systems."—Explain.

2. Apply Single Entry book-keeping to the following transactions:—

Jany.	1st.	I have on hand Cash $1019 50, Goods $4868 45.	
"	1.	Recd. from Jno. Black & Co., goods as per invoice	$470 75
"	1.	Recd. Cash Sales this day	52 87
"	2.	Paid Jas. White on a/c.	80 00
"	2.	Recd. the late Mr. Gordon's Legacy	74 50
"	2.	Recd. Cash Sales this day...	54 85
"	3	Recd. from Jas. White, Edition of Euclid's Elements, per invoice ...	300 65
"	3.	Recd. for Cash Sales this day	45 48
"	4.	Sold A. Macarthur, Goods	24 50
"	4.	Paid Jas. White on a/c.	160 00
"	4	Paid Clerk's Salary, ½ year ending this day	150 00
"	4.	Recd. for this day's shop sales	20 45
"	5.	Remitted Jno. Black & Co., on a/c.	400 00
"	5.	Recd. from Jas. White, Books per invoice	11 20
"	5.	Shop Sales this day	61 50
"	6.	Recd. from Jno. Black & Co., goods, per invoice	213 60
"	6.	Sold A. Macarthur, goods...	72 40
"	6.	Paid Jas. White on a/c.	71 85
"	6.	Paid half-year's rent of warehouse	200 00
"	6.	Bot. a house and received for my bargain	80 00
"	6.	Cash Sales this day	31 64
"	8.	Recd. from A. Macarthur on a/c	80 00
"	8.	Sold A. Macarthur goods...	10 80
"	8.	Remitted Jno. Black & Co., on a/c.	240 00
"	8.	Cash sales this day	48 87
"	9.	Lost a Bank Note, value	40 00
"	9.	Took Stock and found in my possession—	

Cash	$227 81	
Goods	$5594 50	
Debts due to me	27 70	
		$585 01
Debts due by me... ...	$44 35	

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No. 36.

NATURAL PHILOSOPHY.

TIME—THREE HOURS.

1. A particle at A, a point in the straight line FAE, is at rest under the influence of three forces, namely, a force of 1lb. acting in the direction AC, which makes the angle FAC equal to one-third of a right angle; a force of m lbs., in the direction AB, which is at right angles to AC, and makes BAE two-thirds of a right angle; and a force of n lbs., in the direction AD., making the angle DAE one-half of a right angle. Find the relation between m and n.

2. Let AB be a uniform heavy beam, resting with one end B against a wall, and the other end A on the ground, If the reaction of the wall on the beam, and the friction at B, be together equal to the reaction of the ground on the beam at A, compare the distance of A from the wall with the height of B above the ground.

3. Let ABC be a uniform straight rod, in a horizontal position; AB being $6\frac{2}{5}$ feet; and BC, $3\frac{3}{5}$ feet. In DB, a straight line drawn at right angles to AC in a vertical plane, take the point D above the rod, and let DB be $4\frac{4}{5}$ feet. Suppose the rod to be acted on by two forces besides its own weight, namely, a force of 6lbs. acting at A in the direction AD, and one of 8lbs. acting at C in the direction CD. If the rod weigh 10lbs., enquire whether it be in equilibrium. If it be not in equilibrium, specify any force or forces, which, in conjunction with those acting on it, will produce equilibrium. (*It may be assumed that ADC is a right angle*).

4. From a point A on the the earth's surface a particle P is projected upwards in the vertical line ABC, with an initial velocity of 128 feet in the second; sometime afterwards, when P has reached the point B, a particle Q begins to fall from C, a point whose height above A is 304 feet; and in one second more, the distance between the two particles is equal to one-half of BC. Find the time P took to reach B.

5. A and B are two points on a horizontal plane. From A a particle is projected in the direction AC with a velocity of $300\sqrt{(2)}$ feet in the second, C being a point in the vertical plane passing through AB; and at the same instant a particle is projected from B in the direction BC, with such a velocity, that, after 10 seconds the particles come into collision. If CAB be two-thirds of a right angle, and CBA be one-half of a right angle, find the distance between A and B.

6. Two closed hollow cylinders, P and Q, contain the same quantity of air; P is 4 feet in height, and has the radius of its base equal to $\frac{4}{7}$ of a foot; while Q is 3 feet in height, and has the radius of its base equal to $\frac{3}{5}$ of a foot. Compare the entire pressure of the air on the interior surface of P, with the entire pressure on the interior surface of Q

7. Three cubical bodies, A, B, C, each one cubic foot in volume, are connected together; one of the faces of A exactly coinciding with F, a face of B; and one of the faces of C, exactly coinciding with the face of B opposite to F. When the compound body is immersed in water, with the line that passes through the centres of the constituent cubes vertical, it is found that exactly one-half of A is above water. If the sp. gr. of C exceed that of A by $\frac{1}{2}$, the sp. gr. of water being 1, find the depth of tne centre of gravity of the united mass below the surface of the water.

8. Let ABC be a horizontal line; and let BE and BD represent two smooth inclined planes lying towards opposite sides, the angle ABE being two-thirds of a right angle, and the angle CBD being one-third of a right angle. Prove, that, if a uniform heavy rod FG, lying on the planes, the extremity F on BD, and G on BE, be in equilibrium, BF is half the length of the rod.

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No. 37.

BOTANY AND AGRICULTURE.

TIME—ONE HOUR AND A HALF.

1. Name the three classes of Flowerless Plants, and give an example of each.

2. Explain the terms Spore, Capsule, Bract, Stipule, Albumen, and Epiphyte.

3. What are Tendrils, and of what organs are they supposed to be modifications?

4. Give the characters of the Cress Family and name as many plants belonging to it as you can.

5. Name the family described below :—

   "Herbs with square stems and opposite aromatic leaves, a 2-lipped (or rather irregular) corolla, 4 stamens in pairs (2 long and 2 shorter), or else only 2 stamens, and a 4-parted ovary, in fruit making 4 akenes around the base of the single style."

6. Tell what you know about the minute structure and the chemical composition of vegetable tissue.

7. Explain the value of ashes as a manure.

8. Write notes on the cultivation of Broom Corn, Potatoes, and Beans.

9. Explain the difference between the chemical constitution of fertile and that of barren soils.

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No. 38.

ZOOLOGY.

TIME—ONE HOUR.

1. What are the characters which distinguish the higher animals from the higher vegetables? Explain the nature of the difficulties encountered in discriminating between the lower animals and the lower vegetables.

2. With what limitations must the statement, that vertebrate animals are distinguished by possessing a back-bone, be understood?

3. Give the characters of the Cephalopods, the Fishes, and the Amphibians.

4. Name the class and the order to which the following animals belong:—The Duck, the Owl, the Squirrel, the Rhinoceros, the Deer, the Cuttle-fish, the Ant, and the Bee.

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No. 39.

PHYSICS.

TIME—TWO HOURS.

1. A given liquid is found to boil and distil at 200° C. at the ordinary atmospheric pressure, undergoing at the same time partial decomposition; how could you cause the liquid to boil at a lower temperature?

2. Account for the following:—
   (*a*) Water boils sooner in metal than in earthen vessels.
   (*b*) We can place our hand in a jet of high pressure steam escaping from a boiler; but placing it in a jet from a kettle where the steam is low pressure, we should be scalded.
   (*c*) A severe wetting may cause death.

3. You are required to test the relative conducting powers for heat of two metal bars: how would you proceed? Give a few of the best conductors and a few of the worst, and state any practical applications you could make of this knowledge.

4. Describe the method of mixtures for determining the specific heat of substances. 160 grains of mercury at 300° C. are mixed with 20 grains of ice at 0°, and when the mixture is at 0°, the ice is just melted: the latent heat of ice being taken at 80, determine the specific heat of mercury.

5. A lamp and a taper are at a distance of 4.15 m.m. from each other, and it is known that their illuminating powers are as 6 to 1: at what distance from the lamp, in the straight line joining the flames, must a screen be placed that it may be equally illuminated by both?

6. A candle flame is placed at a distance of 3 feet from a concave mirror formed of a portion of a sphere the diameter of which is 3 feet: determine the nature and position of the image of the candle flame produced by the mirror.

7. Explain the principle of the Kaleidoscope. If there are two plane mirrors inclined at an angle of an equilateral triangle, show by a sketch how many images of a point may be seen, and how they will be situated.

8. I rub a glass rod with silk and bring it near an ordinary gold-leaf electroscope—the leaves diverge, and on the removal of the rod collapse again; what kind of electricity causes them to diverge, and why do they collapse? While the leaves are in a state of divergence, I touch the knob of the instrument with my hand and the leaves instantly collapse; I now withdraw my hand, and afterwards the glass rod, and the leaves diverge again: explain the various steps of the process here indicated.

9. Describe a cell of Grove's battery and explain the change which takes place in the cell when the poles are joined by a copper wire. Compare Grove's, Daniell's, and Bunsen's batteries, pointing out the advantages and disadvantages of each.

10. What is an electro-magnet, and in what important points does it differ from an ordinary magnet?

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No. 40.

HUMAN PHYSIOLOGY.

TIME—ONE HOUR.

1. Describe the larynx, and explain the production of vocal sounds.
2. Give an account of the anatomy of the nervous system, distinguish the functions of its different parts, and tell what you know about its modes of action, and its methods of performing its work.
3. Explain the uses to which the various constituents of food are put in the body.
4. Tell what you know about the structure of the tissues.

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No. 41.

DRAWING.

TIME—ONE HOUR.

Draw a common chair standing on the level ; eye of spectator 2 ft. above the seat, front of seat at an angle of 45° from spectator. Drawing to be 4 inches high. Construction and vanishing lines may be ruled and dotted.

The same subject should then be copied, *from the drawing*, on the black board. Construction lines should not be required in this performance.

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No. 42.

MUSIC.

TIME—ONE HOUR.

1. Give the formation of the Major and Minor Diatonic Scale, and the reason for changing the Minor in ascending.

2. Describe single and compound common times with the ordinary signs for each.

3. Write one bar of each kind of note in ordinary use in $\frac{6}{8}$, $\frac{3}{4}$ and $\frac{9}{8}$ time.

4. What is the signature of the key of A Flat Major—and E Minor?

5. Give the sharps and flats in their regular order.

6. What is the use of the clefs, and how many are in general use, stating the proper position of each on the stave, and write the notes, with their names, on the treble and bass staves.

7. Write and sing a scale of two Flats Major and Minor, by intervals of thirds and fourths, ascending and descending.

8. Sing at sight a melody selected for the occasion, describing the time and key in which it is written.

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2nd and 3rd CLASS PROVINCIAL CERTIFICATES.

COMMENCING 20th JULY, 1875.

SOLUTIONS TO QUESTIONS.

ALGEBRA, CLASS II.

1. $2(a^2b^2+b^2c^2+c^2a^2)-(a^4+b^4+c^4)$

2. $\frac{3a}{a+b}$

3. $12x^4-2x^3-11x^2+1$.

4. $\frac{2a(2b^2-5)}{4a-3b}$.

5. $x=\frac{bc-ad}{nb-md}$,

   $y=\frac{bc-ad}{mc-na}$.

6. The given equations are not independent equations, but one of them is deducible from the other; the values of x and y are consequently indeterminate.

7. $88 and $44.

8. 14 days, and $11\frac{2}{3}$ days.

9. $\frac{2}{m-n}$ hours. When $m-n$ is negative, the travellers *were* together $\frac{2}{n-m}$ hours before noon, supposing them to have commenced their journey by that time. When $m=n$, they are at no finite time together.

NATURAL PHILOSOPHY, CLASS II.

1. 14lbs. and 10lbs.

4. The reaction of the plane on the body, exerted in a direction at right angles to the plane.

6. $\frac{AB}{2}$, and $\frac{AB\sqrt{3}}{2}$.

7. 2625×3.1416 lbs

   $\frac{875}{2} \times 3.1416$ lbs.

8. 2125 lbs.

ARITHMETIC—III.

Question.	Account.
1.	$\frac{79}{104}$
2.	12 doz. \$2.39$\frac{7}{12}$, \$4.79$\frac{1}{6}$, \$9.58$\frac{1}{3}$
3.	\$247.98+
4.	\$16,800
5.	Lost \$5
6.	1,694+
7.	300 bbls.
8.	\$7.50
9.	334 yds. $2\frac{5}{38}$ ft.
10.	\$121.088
11.	\$1426.168+

ARITHMETIC II.

Question.	Account.
1.	\$5,000, \$8,750, \$12,250
2.	U. S. bonds $6\frac{42}{43}\%$ Railway bonds $6\frac{8}{17}\%$
3.	60 bbls. of superior 90 " inferior
4.	November 14
5.	$12\frac{1}{2}$ per cent.
6.	£2 3s. $1\frac{1}{2}$d.
7.	\$5,375
8.	32
9.	9s. $8\frac{1}{4}$d.
10.	(a) 41.53 + feet (b) $73\frac{1}{14}$ inches

PROVINCE OF ONTARIO.

DEPARTMENT OF PUBLIC INSTRUCTION.

PUBLIC SCHOOL TEACHERS' EXAMINATION, JULY, 1875.

EXTRACTS FROM THE OFFICIAL REGULATIONS

Time and Place of each Examination.—The yearly examination of candidates for Second and Third Class Certificates shall be held in each County Town in such building as may be appointed by the Inspector, who shall give at least three weeks' public notice thereof, in such manner as he shall deem expedient. The examination of candidates for First Class Certificates shall be held at the same place [at the time mentioned below]; but all candidates for First Class Certificates, who do not already possess Second Class Provincial Certificates, shall be required to previously pass the examination for such Second Class Certificate. No person is eligible to be a candidate for a Second Class Certificate, unless he shall have previously obtained a Third Class Certificate under the present system of examination, or a First or Second Class Certificate under the former system.

Proceedings at each Examination.—The Inspector shall preside at the opening of each examination; and at the hour specified on the first day, and in the presence of such of his colleagues as may be there, and of the candidates, he shall break the seal of the package of examination papers received for that examination from the Education Department. He shall also break open the seal of each additional packet of examination papers as required, in the presence of a co-examiner and of the candidates. He shall further see that at least one examiner is present during the whole time of the examination, in each room occupied by the candidates. He shall, if desirable, appoint one or more of his co-examiners (1) to preside at the examination in any of the subjects named in the programme; (2) to read and report upon the answers as they are received.

Days and Hours of Examination for Second and Third Class Certificates of Qualification for Public School Teachers, commencing 19th July, 1875.

		CLASS II.	CLASS III.
MONDAY, 19th July	2—4.30 P.M.	(1) Zoology, Botany and Agriculture. (Special Paper.)	
TUESDAY, 20th July	9—12 NOON 1.30—3.30 P.M. 3.45—5 P.M.	(2) English Grammar and Etymology. (3) Geography. (4) Book-keeping.	(18) English Grammar and Etymology. (19) Geography.
WEDNESDAY, 21st July	9—12 NOON 1.30—4 P.M. 4.15—5 P.M.	(5) Arithmetic and Mensuration. (6) Education and School Law. (7) Dictation.	(20) Arithmetic and Mensuration. (21) Education and School Law. (7) Reading and Dictation.
THURSDAY, 22nd July	9—11.45 A.M. 1.30—3.45 P.M. 4—5 P.M.	(8) Euclid. (9) History. (10) Composition.	(22) History. (23) Composition.
FRIDAY, 23rd July	9—12 NOON 1.30—4.30 P.M.	(11) Algebra. (12) Natural Philosophy.	
SATURDAY, 24th July	9—10.15 A.M. 10.30—11.45 A.M. 1—2 P.M. 2.15—3.15 P.M. 2.30—3.30 P.M.	(13) Music. (14) Drawing. (15) Chemistry. (16) Botany. (17) Physiology.	

NOTE.—The Examiners will make such arrangements for Reading and Writing as may seem to them most convenient.

Days and Hours of Examination for First Class Certificates of Qualification for Public School Teachers, Commencing 26th July, 1875.

CLASS I.

MONDAY, 26th July	9—12 NOON	(24) Arithmetic and Mensuration.	1.30—3 P.M. 3.15—4.45 P.M.	(25) Education. (26) School Law.
TUESDAY, 27th July	9—12 NOON	(27) English Grammar and Etymology.	1.30—3.30 P.M. 3.45—5 P.M.	(28) Geography. (29) English Literature.
WEDNESDAY, 28th July	9—12 NOON	(30) Euclid.	1.30—3.45 P.M. 4—5 P.M.	(31) History. (32) Composition.
THURSDAY, 29th July	9—12 NOON	(33) Algebra.	1.30—3.30 P.M. 3.45—5 P.M.	(34) Chemistry. (35) Book-keeping.
FRIDAY, 30th July	9—12 NOON	(36) Natural Philosophy.	1.30—3 P.M. 3.15—4 P.M.	(37) Botany and Agriculture. (38) Zoology.
SATURDAY, 31st July	9—11 A.M. 11.15—12.15 P.M.	(39) Physics. (40) Physiology.	1.30—2.30 P.M. 2.45—3.45 P.M.	(41) Drawing. (42) Music.*

*For this year, Music in the *First Class* is optional.

EDUCATION OFFICE,
TORONTO, *June*, 1875.

PROVINCE OF ONTARIO.

XAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 1.

ENGLISH LITERATURE.

TIME—THREE HOURS.

SHAKESPEARE.

1. Describe the character of Lady Macbeth as developed by Shakespeare, introducing quotations when you can.

2. Enumerate the principal influences which operated to quicken the national life and to stimulate the intellectual activity of the English in the latter half of the reign of Queen Elizabeth.

3. Give a synopsis of the evidence adduced by those who hold the view that Shakespeare visited Scotland before Macbeth was written.

4. Explain the italicized words in the following quotations :—

> "Shoughs, water-rugs, and demi-wolves are *cleped*
> All by the name of dogs : the *valued file*
> Distinguishes the swift, the slow, the subtle."
>
> "Come, *seeling* night,
> *Skarf* up the tender eye of pitiful day."
>
> "The title is *affeer'ed*."
>
> "Scotland hath *foysons* to fill up your will."

5. State in what part of Macbeth the following passages occur, and by whom they are uttered :—

> "Can'st thou not minister to a mind diseas'd ;
> Pluck from the memory a rooted sorrow ;
> Raze out the written troubles of the brain ;
> And, with some sweet oblivious antidote,
> Cleanse the stuff'd bosom of that perilous stuff,
> Which weighs upon the heart?"
>
> "Thou hast it now, King, Cawdor, Glamis, all,
> As the weird women promis'd ; and I fear
> Thou play'd'st most foully for't : yet it was said,
> It should not stand in thy posterity ;
> But that myself should be the root, and father
> Of many kings."
>
> "The labour we delight in, physics pain."
>
> "Sleep, that knits up the ravell'd sleave of care,
> The death of each day's life, sore labour's bath,
> Balm of hurt minds, great nature's second course,
> Chief nourisher in life's feast."

MILTON.

6. Give a full account of the part which Milton took in English politics.

7. Dr. Johnson in his criticism of "Il Penseroso" says :—"Milton probably had not yet forsaken the Church." State when this poem was written, and quote or refer to any passage in it that would seem to support Johnson's opinion.

8.

> "Com, pensive Nun, devout and pure,
> Sober, stedfast, and demure,
> All in a robe of darkest grain
> Flowing with majestick train,
> And sable stole of Cipres lawn
> Over thy decent shoulders drawn !
> Com, but keep thy wonted state
> With eev'n step and musing gate
> And looks commercing with the skies,
> Thy rapt soul sitting in thine eyes."—*Il Penseroso : Ll.* 31--40.

(*i*) Write explanatory notes on 'grain,' l. 33 ; 'sable stole of Cipres lawn,' l. 35 ; 'decent,' l. 36 ; 'commerc ing,' l. 39 ; and 'rapt,' l. 40.

(*ii*) Give the derivation of 'demure,' 'stole,' 'musing,' and 'rapt.' Make a list of the words in the languag containing the same root as 'stedfast.'

(*iii*) Parse 'all,' l. 33.

ADDISON.

9. Give an account of the part played by Steele in founding our periodical literature.

0. Write a synopsis of the Vision of Mirzah.

JOHNSON.

1. Compare the prose style of Johnson with that of Addison.

2. Give Johnson's distinction between simile and exemplification.

13. Name the chief writers contemporary with Johnson, and state in what path of literature each of them excelled.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 2.

CHEMISTRY.

Time—Two Hours.

1. A mineral water, in addition to chlorides, contains small quantities of iodides and bromides: how would you detect the presence of these salts in water?

2. Describe the properties of carbon which tend to show that diamond cannot have been formed at a temperature at which pure iron melts. How would you show that carbonic acid (CO_2) is a compound of carbon and oxygen, and that it contains (very nearly) its own volume of oxygen?

3. Describe how you would prove bone-ash to consist chiefly of calcium phosphate. Explain the decomposition of bone-ash by diluted sulphuric acid. Explain by means of symbols the reaction which takes place when a solution of sodium carbonate is added to one of phosphoric acid.

4. Describe the leading properties of arsenic, and name those elements that are usually grouped with it. What means do we possess for the detection of small quantities of arsenic? Name the substance which is considered the best antidote against it. State how you would determine whether a given gas consists of arseniuretted or antimoniuretted hydrogen.

5. Describe the preparation of potassium from potassium carbonate, and explain the process. State how you would distinguish potassium from sodium, and how detect each metal in its compound.

6. By what experiments would you prove that gunpowder is a mixture and not a compound. Explain fully how the substances of which it is composed act on each other during combustion. How do you explain the mechanical effects produced by the explosion of gunpowder?

7. How is metallic lead obtained from galena? A sample of water is supposed to contain a small quantity of a lead compound: describe fully how you would examine the water for lead.

8. How would you prepare pure silver from an alloy of silver and copper? Why is silver considered a monovalent metal? Enumerate the oxides of silver and give a brief description of each of them. The ordinary silver coins are made of an alloy of silver and copper: how would you prove the presence of both these metals in a coin?

9. State the composition per cent. of iron pyrites, epsom salts, calomel, and corrosive sublimate.

10. What weight of marble, when acted on by hydrochloric acid, will yield a cubic foot of carbonic acid gas?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 3.

BOTANY AND AGRICULTURE.

TIME—TWO HOURS.

1. Explain the origin of the different kinds of placentas ; and of the different parts of the fruit of the plum the oak, and the maple.
2. Describe fully the process by which it is supposed that water is carried up from the roots of plants.
3. Give the meaning of the terms *stomata, indehiscent, thyme, glume, and pyxis.* Distinguish *epiphytes* from *parasites.*
4. Describe any plant which you have examined ; if you can, tabulate your description.
5. Name all the families of monopetalous dicotyledons which you remember, and give the characters of any one of them.
6. Illustrate the connection between the arrangement of leaves on the stem, and the position of the various parts of the flower.
7. What are the most important mineral constituents of wheat, of wheat straw, of the tubers of the potato, and of clover?
8. Explain the value of gypsum as a manure.
9. Write notes on the proper methods of cultivating Indian Corn, Peas, and Turnips.
10. Compare the chemical composition of wheat and beef.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 4.

ARITHMETIC.

TIME—THREE HOURS.

1. Prove the rules for pointing in Multiplication and Division of Decimals.

Reduce to its simplest form $$\frac{(\cdot 075)^5 + (\cdot 05)^5}{(\cdot 075)^4 - (\cdot 075)^2(\cdot 025)^2 + (\cdot 05)^4}$$

2. The owner of some city property allows his agent 5% for collecting his rents ; the amount which he annually pays for insurance and repairs (and on which he pays no income tax) is $8\frac{4}{7}$% of his net income ; his income tax at 2 cents $7\frac{1}{2}$ mills on the dollar, is \$198·25 : Find the gross rents from his city property.

3. Reckoning commercial discount at 8%, how many years would a bill have to run so that the holder would be willing to pay something to get it off his hands? Shew that the error in computing commercial discount, instead of true discount, varies nearly as the square of the time, when the time is small, and where the discount is small compared with the debt.

The interest on a sum of money for 2 years is \$$71\frac{133}{160}$, and the discount for the same time is \$$63\frac{17}{20}$; Find the rate % and the sum of money.

4. A Building Society wishes to realize 10% on its loans ; the instalments paid to it can be reinvested at 3% per half-year ; extending the formulæ $A = PR^n$ to include the case of n being fractional, shew that the quarterly instalment on a loan of \$1,000, payable in 6 years, is $1{,}000(1\cdot 1)^6 \times \frac{\sqrt{1\cdot 03} - 1}{(1\cdot 03)^{12} - 1}$

5. A retail dealer bought a quantity of broadcloth and marked it for sale at an advance of 20% on cost ; in measuring it off to his customers he used a false yard measure, by which he gained on the entire sale an additional sum of \$39, making on the whole a profit of \$379.20 : Find the cost price of the cloth and the length of his yard-stick.

6. By the construction of the Canada Pacific Railway, 80% is added to the debt of the Dominion ; for the next fourteen years after the completion of the road \$5,000,000 of the principal, in addition to the interest, is annually paid off, and at the end of that time the rate of interest on the national debt is reduced 10% ; if, in spite of these reductions, it be found that the interest on the public debt is still 20% more than before the increased debt, find the cost of the Pacific Railway.

7. Examine the merits of the following definition : "Four quantities are said to be proportional when a part of the first is contained in the second as often as a like part of the third is contained in the fourth." Give examples of its failure.

Where do you consider that the notion of ratio is first introduced in works on arithmetic?

Given that the distance through which a body draws another in one second varies as the force of attraction ; that the force of attraction is directly proportional to the mass of the first body, and inversely to the square of the distance from the centre ; that the mass is proportional to the product of the density and volume ; and that when the earth's volume and density are each unity, those of Jupiter are 1387·431 and ·22 respectively : Find how far a body will fall from rest in one second at the surface of Jupiter, if at the surface of the earth it fall through 16·08 feet in the same time.

8. A person has an estate which yields a net income of £1620, after paying expenses to the extent of 10%. He sells it and invests the proceeds in the $4\frac{1}{2}$ per cents at 96, the income now being subject to charges of 5%, and his net income is £16.17*s*.6*d*. less than before : Find for how many years' purchase on the gross income he sold his property.

9. English standard gold is $\frac{1}{12}$ alloy, and $44\frac{1}{2}$ guineas weigh one pound troy ; the weight of a shilling is $87\frac{3}{11}$ grains troy, and pure silver is $14\frac{1393}{4840}$ heavier than an equal value of pure gold. If silver were to fall one per cent. in value, find what change would have to be made in the alloy in a shilling in order that 20 shillings might still be equal to £1, the alloy being supposed of the same specific gravity as silver, and the weight of the shilling unchanged.

10. (*a*) The three sides of a triangle are 20, 30, and 25 respectively : Find the position of the point which is equally distant from the three angles.

(*b*) Two sides of a triangle are 8 and $12\frac{1}{2}$ respectively, and the line bisecting the angle they contain is 6 : Find the third side.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 5.

GEOGRAPHY.

TIME—TWO HOURS.

No.

I.—Discuss the origin and development of prairies.

II.—What is the rate of increase in the temperature of the earth in descending from the surface towards the centre? What thermal phenomena arise therefrom, and why is the surface temperature affected so little by the internal heat?

III.—Account for the formation of stratified and unstratified rocks, and classify the latter in chronological order.

IV.—What points of similarity are noticeable in the vertical relief of all the continents?

V.—Give examples of remote and recent changes in the configuration of the earth's surface.

VI.—If a person go around the world westward to the place whence he set out, how much time will he gain or lose? Explain.

VII.—Define the following:—Declination, Cardinal Points in the Heavens, Equinoctial Points, Nodes, Disc, Apogee, Transit, Perihelion.

VIII.—Name the States of the American Union, east of the Mississippi, with the capital of each.

IX.—Give the chief commercial and manufacturing centres of France, Germany and Great Britain, and state for what each is famous.

X.—Draw an outline map of Europe, and locate Nice, Hamburg, Drontheim, Milan, Warsaw, Oporto, Heligoland, Corfu, Malta, Arno, Meuse, Ems, Danube with its tributaries.

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1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 6.

ENGLISH COMPOSITION.

TIME—ONE HOUR AND A QUARTER.

Candidates will select one of the following subjects :—

(*a*) The Genius of Shakspere.

(*b*) The Revival of Learning.

(*c*) "In the elder days of Art,
Builders wrought with greatest care
Each minute and unseen part:
For the gods see everywhere.

"Let us do our work as well,
Both the unseen and the seen ;
Make the house, where gods may dwell,
Beautiful, entire, and clean."

PROVINCE OF ONTARIO.

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No. 7.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

1.

Lady Macbeth.— * * * * * * *
* * * * Art thou afeard
To be the same in thine own act and valour,
As thou art in desire? Would'st thou have that
Which thou esteem'st the ornament of life,
And live a coward in thine own esteem ;
Letting I dare not wait upon I would,
Like the poor cat i' the adage?
Macbeth.— Prithee, peace :
I dare do all that may become a man ;
Who dares do more, is none.
Lady Macbeth.— What beast was't then,
That made you break this enterprise to me?
When you durst do it, then you were a man ;
And, to be more than what you were, you would
Be so much more the man. Nor time, nor place,
Did then adhere, and yet you would make both :
They have made themselves, and that their fitness now
Does unmake you.

(i.) Divide into propositions and fully analyse the second sentence in each of Lady Macbeth's speeches.

(ii.) Parse 'which' and 'ornament,' l. 4 ; 'coward,' l. 5 ; all the words in l. 6 ; 'man,' l. 8 ; 'none,' l. 9 ; 'durst,' l. 11 ; 'to be more,' l. 12 ; "more," l. 13 ; and 'that,' l. 15.

(iii.) Explain the derivation of *afeard, afraid, valour, ornament, prithee, peace, enterprise, lady, esteem, adhere* and *desire.*

(iv.) What is the meaning of 'break' in l. 10, and of 'adhere' in l. 14?

(v.) Scan ll. 5 and 6, naming the feet.

(vi.) Point out the figures of speech that occur.

2. Parse the italicized words in the following sentences from Macaulay's letters :—

"I will not omit writing two *days running.*"

"The great topic *now* in London, is not, as you perhaps fancy, Reform, but cholera. There is a great panic, as great a panic as I remember, *particularly* in the City.

"When Chantrey dined with Rogers some *time ago,*" etc.

"Her ladyship is *all* courtesy and kindness to me."

"Well, writing to constituents is *less of a plague* to you than to most people.

"*Now that* I had risen again, he hoped that they should hear me often."

3. Distinguish between the following words :—Common and mutual ; stationery and stationary ; feminine and effeminate ; sanitary and sanatory ; persecute and torment ; loiter and linger.

4. What information about the following things, namely, port [wine], sherry, nankeen, ammonia, bayonet, cherry, currants, may be obtained from the names they bear?

5. Define ADJECTIVE and PRONOUN ; state how you classify adjectives and pronouns ; show where you draw the line between these parts of speech ; and explain your views with regard to the parsing of *his, each, this, all, another, what,* and *some,* in the various constructions in which they may occur. Give reasons for your answers.

6. Explain the meaning of orthoepy, idiom, dialect, and metaphor, and give the best definitions you know of letter, syllable, and word.

7. Give examples of sentences in which it is more appropriate to use 'that' than 'who' or 'which.' Explain the reason in each case.

8. Correct or justify, in either case giving your reasons, the following sentences :—

"In this poem is a very confident and discriminate character of Spenser, whose work he had then never read."
—*Dr. Johnson.*

"This is one of the most successful works that ever was executed."

"The trade of Marseilles vastly increased since the French have had Algiers."

"He always begins by drawing down his shaggy eyebrows, making a face extremely like his uncle, wagging his head and saying," etc.
Macaulay.

PROVINCE OF ONTARIO.

NATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 8.

EDUCATION.

TIME—TWO HOURS.

.B.—In valuing answers to this paper, attention will be paid to clearness of thought and accuracy of expression. Marks will be deducted for all irrelevant matter.

1. Define Education? What is the value to a Teacher of a good definition of Education? Criticise in respect to influence on practice :—

> "Pædogogy is the art of making man moral."—*Hegel.*
>
> "Education consists in the ideas and facts gained and properly classified by the learner."
>
> "The object of Education is not the immediate knowledge which it gives, but it is the instrument by which one may learn hereafter."—*Sir W. V. Harcourt.*

2. State the qualifications of an accomplished teacher.

3. What is necessary that educational experience may be of value?

4. State concisely the fundamental principles of Science-Teaching.—(Physical Science.)

5. "To give problems, and on the pupil failing to solve them, to show him the solution is utterly useless." —*R. A. Proctor.* Do you accept this statement? If so, what would you do in case of a pupil failing to solve a problem set?

6. "*A*, is a boy of seven years of age, quick-witted, eager to gain knowledge in his own way, indifferent to books and heedless of rules and regulations, of an amiable, facile disposition, but of an irritable temperament. *B*, is a boy of the same age, devoted to play and mere animal enjoyment, indifferent to knowledge of any kind as knowledge, quite contented with his idleness, without any ambition after excellence, sullen when much thwarted, but obedient to regulations because obedience saves trouble. How would you treat these cases? Explain your rules of action by reference to distinct principles of Education."—*J. Payne.*

7. Discuss *one* of the following :—

   The use (not the abuse) of text-books.
   Prizes *versus* rewards.
   Much, not many things.

8. Give notes on an introductory lesson on *one* of the following subjects :—

   The Tenses.
   Fractions.
   The Positive and Negative Affections in Algebra.
   A Buttercup. (Botany, Fourth Class).
   The Eye. (Human Physiology, Fifth Class).

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 9.

SCHOOL-LAW.

TIME—ONE HOUR AND A QUARTER.

1. What is the difference between Union and United Sections? Upon what conditions only can the latter be formed? How can a piece of land in a Union Section be attached to another Section? What is the law relating to the assessment of Union School Sections?

2. What is the law relating to the selection of School Sites in rural Sections? Let your answer provide for all cases of disagreement.

3. What provisions does the law make for establishing Township Boards of Trustees?

4. What is the law relating to the forming of new Sections; and how can the first meeting of the rate-payers be called?

5. What is the law relating (1) to the taking of votes at a School meeting, (2) to protests, (3) to making the declaration of office by a Trustee-elect, (4) to transmitting minutes to Inspector?

6. In order that Trustees' Corporate Acts shall be binding what conditions must be observed?

7. Give in full the conditions upon which Trustee Corporations can borrow money.

8. Who are (1) residents, (2) School Electors of a Section?

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 10.

EUCLID.

Time—Three Hours.

N.B.—Algebraic symbols must not be used.

1. (*a*) The straight line drawn at right angles to the diameter of a circle from the extremity of it, falls without the circle; and no straight line can be drawn from the extremity, between that straight line and the circumference, so as not to cut the circle, (III, 16.)
   (*b*) Draw a common tangent to two given circles. How many can be drawn? (*Apollcnius.*)

2. (*a*) The opposite angles of any quadrilateral figure inscribed in a circle are together equal to two right angles. (III. 22.)
   (*b*) If straight lines be drawn from any point on the circumference of a circle perpendicular to the sides of an inscribed triangle, their feet are in the same straight line. (*M. F. Jacobi.*)

3. (*a*) If the chord of a circle be divided into two segments by a point in the chord or in the chord produced, the rectangle contained by these segments will be equal to the difference of the squares on the radius and on the line joining the given point with the centre of the circle. What propositions in Euclid follow immediately from this?
   (*b*) Describe a circle which shall pass through a given point and touch two straight lines given in position (*Apollonius.*)

4. (*a*) To describe an isosceles triangle, having each of the angles at the base double of the third angle. (IV. 10.)
   (*b*) Construct a triangle having each of the angles at the base equal to seven times the third angle.

5. (*a*) If the vertical angle of a triangle be bisected by a straight line which also cuts the base, the segments of the base have the same ratio which the other sides of the triangle have to one another; and, if the segments of the base have the same ratio which the other sides of the triangle have to one another, the straight line drawn from the vertex to the point of section, shall bisect the vertical angle. (VI. 3.)
   (*b*) The points in which the bisectors of the external angles of a triangle meet the opposite sides, lie in a straight line.

No. 13.

PROVINCE OF ONTARIO.

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1st CLASS PROVINCIAL CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 11.

HISTORY.

TIME—TWO HOURS.

1.—State fully, but concisely, the causes which led up to the granting of Magna Charta, and give the chief provisions of that document.

2.—Specify the evils which occasioned the revolt of the English peasantry in the 14th century. What were the results of that revolt?

3.—Give the principal events of the reign of Henry VII. Be concise.

4.—What were the Acts of Supremacy and Uniformity? Give some account of the Court of Star Chamber and of the High Commission Court.

5.—"What the Great Rebellion in its final result actually did, was to wipe away every trace of the New Monarchy, and to take up again the thread of our political development just where it had been snapped by the wars of the Roses." (Green's History of the English People.) Explain and illustrate this statement.

6.—Tell the origin and course of the war closed by the Treaty of Ryswick.

7.—State what you know of the following persons: Owen Glendower, Thomas Cromwell, James Duke of Monmouth, Sir Robert Walpole.

8.—Enumerate the wars carried on by Great Britain in Asia during the present reign.

9.—Tell the geographical position of these battle fields, and assign the proper dates: Bannockburn, Edge-Hill, Sedgemoor, Lexington, Assaye, Vimiera, Alma.

10.—Write brief explanatory notes on the "Secularization of the Clergy Reserves," the "Abolition of the Seignorial Tenure," the "Durham Report."

11.—Distinguish the Punic wars of Rome; name the chief leaders engaged, and the principal battles in each. Dates.

12.—Give the particulars of the battles of Marathon, Mantinea and Arbela.

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No. 12.

BOOK-KEEPING.

TIME—ONE HOUR AND A QUARTER.

No.

I. Give in full your method of closing a set of Books (Double Entry).

II. Classify the following accounts for closing purposes, and explain how each account is closed—Stock, Cash, Merchandise, Balance, Bank, Bank-Stock.

III. Give the Day Book entries that would require the following Journal entries :—

	$ cts.	$ cts.
(a) John Thompson, Dr.	1800 00	
Bank, ,,	1200 00	
To Bills Receivable		3000 00
(b) Shipment to A. Low, Dr.	1400 00	
A. Low, ,,	750 00	
To Merchandise		1100 00
,, Cash		1050 00
(c) John Henry, Dr	120 00	
To John Henry's consignment		120 00

IV. Journalize the following transactions, post and close the Ledger :—

July 1st, 1876. Invested in business, cash, $400 ; merchandise, $4,750 ; a note for $600 in favour of John Hill, signed by W. Willings, and endorsed by H. Cooper, dated May, 18th, 1875, at 90 days ; an accepted draft for $500, drawn by H. Simpson on George Dean, May 10th, 1875, at 90 days, and accepted May 15th ; R. Manning's account, $300 ; Real Estate, $3,000. 2nd. Sold McCrea Brothers merchandise as per invoice, $200 ; received in payment cheque on Ontario Bank for $100, their note to balance. 3rd. Shipped R. Manning $3,000 worth of merchandise, one half from my storehouse, balance bought from J. Heal on my note at 30 days. 4th. Received from R. Manning his second consignment, consisting of 100 bbls. flour, invoiced at $8 per bbl. ; paid freight and drayage on same by cheque, $180. 6th. Sold R. Dunn 100 bbls. flour, from R. Manning's consignment No. 2, at $12.60 per bbl. ; received in payment a cheque on Bank for $300, an order on A. B. for $60, cash for balance. 10th. Closed R. Manning's consignment (No. 2), and rendered him an account sales of the same ; our charges for storage, &c., $20 ; commission, $40 ; R. Manning's net proceeds, remitted in cash, $1,020. 16th. Received account sales of merchandise shipped R. Manning on the 3rd inst., accompanied by a cheque for amt. of our net proceeds, $3,500, which I deposited in Bank. Merchandise on hand, as per inventory, $3,250.00.

V. Write out the Business Forms required in the preceding question for the 1st and 2nd of the month.

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No. 13.

NATURAL PHILOSOPHY.

Time.—Three Hours.

1. Enunciate the Triangle of Forces, and by means of it deduce the Principle of Moments.

Find the resultant of three forces acting in consecutive directions round a triangle, and represented respectively by its sides.

2. A lever without weight is c feet in length, and from its ends a weight is supported by two strings in length a and b feet respectively. Find the ratio of the lengths of the arms, if there be equilibrium when the lever is horizontal.

3. A piece of uniform wire is bent into the form of a triangle; find the position of its centre of gravity.

4. State Newton's Laws of Motion. What is the meaning of "Motion" in the First Law? What is its meaning in the Second Law, and how is it measured? What is the meaning of "Action" in the Third Law, and how is it measured?

Deduce the Parallelogram of Forces from the Second Law of Motion.

5. A swing-gate weighing 96 lbs. rests on a hinge A, and against a frictionless turning-point B, four feet directly beneath A. Find the strain on the hinge and the pressure on the point, given that the centre of gravity of the gate is 4 ft. 7 in. from AB.

What will be the strain and the pressure if a boy weighing 108 lbs. stands on the gate 6 ft. from AB?

6. The radii of the fore and hind wheels of a coach are r and R respectively, and d is the distance between their centres. A particle driven from the highest point of the hind wheel falls on the highest point of the fore wheel. Find the velocity of the coach.

7. A heavy sphere of density 6·8 is placed in a vertical cylinder filled with atmospheric air. Find the density of the air in the cylinder when the sphere, which exactly fits the cylinder, is in a position of permanent rest. Height of the barometer 30 inches, density of mercury 13·6.

8. A body weighs w in air by a common scale with brass weights; will it weigh more or less by the same in a vacuum?

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No. 14.

HUMAN PHYSIOLOGY AND ZOOLOGY.

TIME.—TWO HOURS.

1. Enumerate the principal sources of loss and of gain to the blood.

2. You eat a mouthful of beef (mixed fat and lean) and potato, describe the processes it undergoes until all the nutritive matter is absorbed.

3. What are the effects of respiration? Sketch the respiratory mechanism.

4. Describe briefly the structure and functions of the ear.

1. What are the general characteristics of the vertebrata?

2. Give notes on any dissection you have made, including your preparation of the subject, and mode of conducting the dissection.

Candidates who have not made any dissections will substitute the following question:—

Name the class and order to which each of the following animals belong:—Pig, Raccoon, Chipmunk, Swallow, Robin (Canadian), Mud Turtle, Hunting Spider, House Fly.

3. Describe and sketch, *(a)* The beak and foot of a passerine bird. *(b)* The jaws and poison-fangs of a venomous serpent.

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COMMENCING 10th JULY, 1876.

Nos. 15 and 32.

MUSIC.

alues.

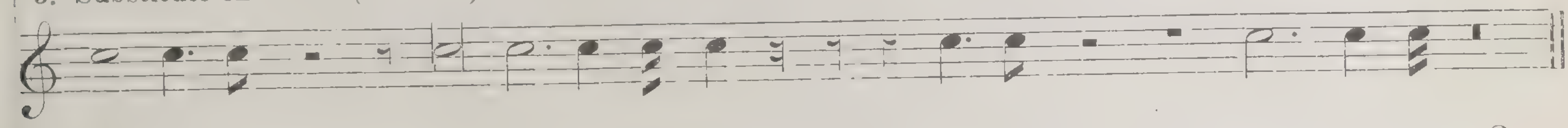
5 1. What is meant by the pitch of sounds? Write all the characters which represent musical sounds, and give the names of each. How are the sounds named? Write the names of the notes in two clefs.

7 2. Write all the characters used in music to indicate silence. Give names and examples showing how the characters for sounds and silence are related to each other. State relative values. Write examples of the effect of the dot and double dot upon notes and rests—the slur, tie—staccato. Bar-measure; double bar; signature.

6 3. Explain what the stave is and its use; also, ledger lines, clefs, sharp, flat, double sharp, double flat, natural and accidental. Write out triplets of quarter notes (crotchets), eighth notes (quavers), and sixteenth notes (semi-quavers, stating their value.

7 4. What is a degree?—semitone?—tone? —interval?—octave?—scale?—and name the different kinds of scales. Write the diatonic scale in three different keys, and give alphabetic and syllabic names of notes. Write the signatures of the scales of E♭, B, and F♯.

12 5. Substitute on a staff (or stave) notes for the following rests, and rests for notes:—



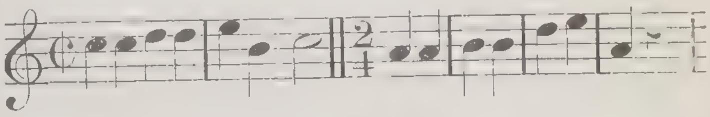
What is rhythm? Explain fully the signatures 𝄴 or $\frac{4}{4}$ and $\frac{6}{8}$. Write out a passage of six measures in $\frac{2}{4}$, 𝄴 and 𝄵 rythms, varying the notes in the different measures. Also, six measures in $\frac{3}{2}$, $\frac{3}{4}$, $\frac{3}{8}$, $\frac{6}{8}$, $\frac{12}{8}$ and $\frac{9}{8}$ rythms, varying the measures.

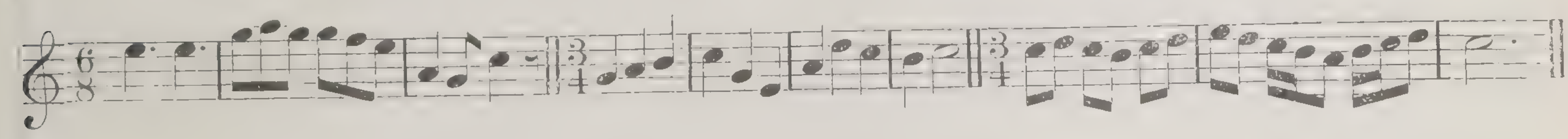
What is *time* in music? and what are the various kinds? Write some short passages of music in common, triple, compound common and compound triple rhythms. Distinguish between time and rhythm.

6 6. Write out the words in full and explain the meaning of *p*, *pp*, *mf*, *mp*, *f*, *ff*. Give meanings of piu forte, piu piano, poco, poco piu forte. Write the sign which indicates the same effect as cres. (or crescendo), decres. (or decrescendo), and explain meanings.

5 7. Define accent. How does it differ from emphasis?

Mark where the accent falls in the adjoining passages:—

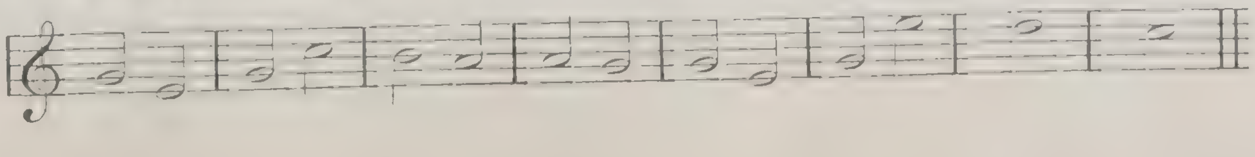




7 8. Define in English the following Italian words:—Adagio, andante, allegro, largo, maestoso, presto, quasi allegretto, suave, strepitoso. Write out six measures of 𝄴 and $\frac{3}{4}$ rhythms, commencing on the unaccented part of the measure, and introducing rests. What is syncopation? Write six measures of $\frac{6}{8}$ rhythm, introducing syncopated passages. Describe the mode of beating the following rhythms:—$\frac{2}{4}$, 𝄴, $\frac{3}{2}$, $\frac{6}{8}$, slow; $\frac{6}{8}$, quick.

12 9. Explain the order in which the sounds of the diatonic scale should succeed each other, and write the scales of do, re, mi, si♭, and mi♭, giving the theoretical name of each degree of the scale. What is the meaning of the words tonic, dominant and subdominant? What is the difference between major and minor? Write minor scales in three keys. Write the intervals of the 2nd, 3rd, 4th and 5th, and mark which are major, minor, perfect and imperfect. What is an inversion? Give the inversions of each interval within the octave.

9 10. What is a triad, and how is it formed? How many times is it found in the octave? and where major, and where minor? What is modulation? What is transposition? Transpose the following phrase into re and mi.



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No. 16.

ALGEBRA.

TIME—THREE HOURS.

1 Investigate Horner's method of division.

Divide $x^9 - 3x^8 - 31x^7 + 25x^6 + 3x^5 - 8x^3 + 19x^2 + 8x + 10$ by $3x^4 - 21x^3 + 9x - 6$, showing the "final remainder."

Find the value of $2x^5 + 803x^4 - 398x^3 + 1605x^2 - 1204x + 422$, when $x = -402$.

2 If $f(x)$, a rational and integral function of x is divided by $x^2 + px + q$, the remainder is

$$\frac{f(\alpha) - f(\beta) + \alpha f(\beta) - \beta f(\alpha)}{\alpha - \beta},$$ where α, β are the roots of $x^2 + px + q = 0$.

Examine the case where $p^2 = 4q$.

3 Show without actual expansion that

$$\frac{a^4(b^2-c^2)+b^4(c^2-a^2)+c^4(a^2-b^2)}{a^2(b-c)+b^2(c-a)+c^2(a-b)} = \frac{(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3}{(a-b)^3+(b-c)^3+(c-a)^3}$$

4 Find the values of x and y that will render the fraction $\frac{2z^2+(x-a)z+2b(x-2c)}{3z^2+(y-b)z+3a(y-3c)}$,

the same for all values of z.

5 If the equations $ax^3+bx+c=0$, $a+bx+cx^3=0$ be not identical, and have two roots in common, these roots are imaginary

6 Show how to find the sum of n terms of a series in Geometric progression.

(1) Show that the sum of n terms of the series $1+r+(1+2r)(1+r)+(1+3r)(1+r)^2+ \text{- - - -}$, is $n(1+r)^n$.

(2) Sum to infinity the series $\frac{1}{2\cdot4\cdot6}+\frac{1}{4\cdot6\cdot8}+\frac{1}{6\cdot8\cdot10}+ \text{- - -}$

7 Explain the notation of functions: prove that if $f(m) = 1 + mx + \frac{m(m-1)}{1\cdot2}x^2 + \text{\&c.}$, then $f(m) \times f(n) = f(m+n)$.

Show that in the expansion of $(1+x)^n$ the sum of the squares of the co-efficients $= \frac{1.2.3 \text{ - - - - } 2n}{(1.2.3 \text{ - - - - } n)^2}$.

8 Solve the equations—

$$(1)\quad \frac{x-a}{b+c}+\frac{x-b}{a+c}+\frac{x-c}{a+b}=3.$$

$$(2)\quad x^4-10x^3+35x^2-50x+24=0.$$

$$(3)\quad \frac{1}{21x^2-13x+2}+\frac{1}{28x^2-15x+2}=12x^2-7x+1.$$

9 Give a brief account of mathematical induction, and show that the square of a multinomial is equal to the square of each term together with twice the product of each term into the sum of all that follow it.

Find the sum of the products of the first n natural numbers taken two and two together.

10 If $\frac{x}{a}=y+z$, $\frac{y}{b}=z+x$, $\frac{z}{c}=x+y$, prove

$$(1)\quad \frac{1}{a}\cdot\frac{1}{b}\cdot\frac{1}{c}=\frac{1+a}{1-ab}\cdot\frac{1+b}{1-bc}\cdot\frac{1+c}{1-ca}.$$

$$(2)\quad \frac{x^2}{a(1-bc)}=\frac{y^2}{b(1-ca)}=\frac{z^2}{c(1-ab)}.$$

$$(3)\quad \frac{\sqrt{1-bc}}{a}+\frac{\sqrt{1-ca}}{b}+\frac{\sqrt{1-ab}}{c}=\frac{\sqrt{1-bc}}{a}\cdot\frac{\sqrt{1-ca}}{b}\cdot\frac{\sqrt{1-ab}}{c}$$

11 A B is divided in C, so that AB, BC=AC^2; from CA is cut off a part CD equal to CB; from DC is cut off a part DE equal to DA; from ED is cut off a part equal to EC, and so on *ad inf.* Show that the points of section continually approach a point C′ such that AC′=BC.

12 Eliminate x, y, z and u from the equations

$$a_1x+b_1y+c_1z+d_1u=0.$$
$$a_2x+b_2y+c_2z+d_2u=0.$$
$$a_3x+b_3y+c_3z+d_3u=0.$$
$$a_4x+b_4y+c_4z+d_4u=0.$$

13 A railway train travels from Toronto to Collingwood. At Newmarket it stops 7 minutes for water, and two minutes after leaving the latter place it meets a special express that left Collingwood when the former was 28 miles on the other side of Newmarket; the express travels at double the rate of the other, and runs the distance from Collingwood to Newmarket in $1\frac{1}{2}$ hour; and if on reaching Toronto it returned at once to Collingwood, it would arrive there three minutes after the first train: find the distance between Toronto, Newmarket and Collingwood.

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No. 17.

PHYSICS.

TIME—TWO HOURS.

1. Describe fully some one experiment by which the mechanical equivalent of heat has been ascertained, and state approximately the numerical result.
   It is found that equal weights of water and copper require respectively 100 units and 9 units to raise their temperature by the same amount: find from this fact how much a mass of copper would be raised in temperature by striking a hard non-conducting surface after a fall of 36 feet.

2. How may the quantity of heat in a body be measured?
   To what height would a weight of 193 lbs. be raised by cooling 5 lbs. of boiling water, the temperature of the air being 62 F.?

3. What is the cause of the difference between the specific heat of air at constant pressure and at constant volume?

4. If a luminous point be seen after reflection at a plane mirror by an eye in a given position, there is a certain space within which the image of the point can never be situated, however the position of the plane of the mirror be changed; find this space.

5. Give an account of "Frauenhofer's lines" in the Solar Spectrum.
   Sodium introduced into the flame of a Bunsen burner produces the well known yellow line in the spectrum of the flame. If, however, the yellow light is made to pass through sodium vapour before it can reach the prism, no yellow light is seen: explain fully the cause of this result. What inferences would you draw from this concerning the material constitution of the sun?

6. Describe the construction and explain the action of Holtz's electric machine, in which a small initial charge of electricity is made to give rise to an indefinite supply of electricity of a high tension, and show how its effects can be reconciled with the principle of the Conservation of Energy.

7. Describe the construction of a Grove's galvanic cell, and the nature of the chemical action which takes place in it during the passage of the current.
   The current from a battery of 6 Grove's cells, connected in a series, passes through a voltameter containing acidulated water: what is the weight of zinc dissolved in the battery while ·36 of a gramme of water is decomposed in the voltameter?

8. How would you compare the magnetic intensities of two places on the earth's surface?

9. Describe the construction of the Induction Coil, explaining the special functions of each of its principal parts.

10. Describe the Astronomical Telescope; trace the course of a pencil of rays from any point of a distant object, and find the magnifying power.
    If the focal lengths of the lenses be 12 inches and 1 inch, how far must the eye-glass be moved for viewing an object at a distance of 40 feet from the object-glass?

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No. 18.

DRAWING.

TIME—ONE HOUR AND A QUARTER.

Value—50 for each.

Draw a common wheelbarrow standing on level, at an angle of 45°, with spectator height of eye 3 feet above object. Drawing to be 5 inches long. Show construction lines, wheel facing spectator.

The same subject should then be copied, from the drawing, $\frac{3}{4}$ size of original drawing.

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CHEMISTRY, BOTANY AND PHYSIOLOGY.

TIME—TWO HOURS.

Values.

14 1. Explain the composition of the different kinds of hard water.

15 2. Describe the methods by which hydrogen may be obtained from water. Show what becomes of the oxygen in each case.

15 3. What gases go up the pipe of an ordinary wood-burning stove? Give a short description of each of them. Account for the deposition of soot in the pipe.

16 4. State accurately the composition of Nitric Acid, Carbonic Acid Gas, Hydrochloric Acid, and Sulphuric Acid, giving in each case the formula and the molecular weight.

15 5. What differences besides those in the seed-leaves distinguish acotyledonous, monocotyledonous, and dicotyledonous plants?

16 6. Explain the meaning of the terms Sepal, Bract, Raceme, and Stipule. Describe minutely the Stamen and the Pistil, and give the names applied to their parts.

14 7. Are the portions of the onion, the potato, and the turnip, which are capable of preservation through the winter, equally entitled to the name of roots? Give reasons for your answer.

16 8. Write explanatory notes about Sutures, Synovial Glands, Salivary Glands, and Hinge Joints.

15 9. Classify the milk teeth and the permanent teeth. At what age do the different molars make their appearance? Describe the structure and mode of growth of the teeth.

14 10. Explain how the bones are nourished, and describe their structure. What is their chemical composition?

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No. 20.

DRAWING.

TIME—ONE HOUR AND A QUARTER.

Value—10 for each.

1.—Give definitions concerning parallelograms.

2.—Draw a perpendicular to a given line from any point above the line.

3.—Draw a line parallel to a given line from any point above the line.

4.—Give method for dividing a line into any given number of parts.

5.—Give definitions concerning triangles.

6.—Draw a circle through three given points not in a straight line.

7.—Construct an angle equal to a given angle.

8.—Give definitions concerning four-sided figures which are not parallelograms.

9.—Find the centre of a circle.

10.—Give method for dividing the protractor into 180 degrees.

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2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 21

ARITHMETIC.

TIME—THREE HOURS.

Values.

25 1. Find the difference between $\left(\frac{\cdot 26 + \cdot 2 \text{ of } 3 \cdot 7}{\cdot 48 - \cdot 014 \text{ of } 20} - \frac{4 \cdot \dot{3} + 5 \cdot \dot{6}}{7 \cdot \dot{4} - \cdot \dot{2} \text{ of } 11}\right)$ of £1 10*s.* 6*d.*

and $\left(\frac{\frac{1}{2} \text{ of } \frac{5}{9} \text{ of } 7\frac{1}{5}}{\frac{1}{3} + 4\frac{1}{2} \text{ of } \frac{4}{27}} + \frac{\frac{4}{5} - 2\frac{1}{3} + 1\frac{8}{15}}{\frac{7}{95} + 150\frac{5}{19} - 74\frac{2}{5}}\right)$ of £1 5*s.* 6*d.*

25 2. Show that Bank discount exceeds true discount by the simple interest on the true discount. Find the amount which a banker gains by discounting a bill of \$2451 50, drawn 12th July at 4 months, and discounted September 3rd, at 5 per cent. per annum, usual days of grace: give answer to exact fraction of a cent.

25 3. A retail merchant bought a quantity of Canadian tweed, and marked it at an advance of 25 per cent. on cost, and in selling it used a yard measure which was $\frac{3}{4}$ of an inch too short, his entire gain being \$124 80; find the cost price of the cloth, and the amount the merchant gained by using the false measure.

25 4. A person invests a certain sum (U. S. currency) in U. S. 5's 10-40 (*i.e.* certain bonds paying 5 per cent.), and $70\frac{10}{19}$ per cent. more than that sum in U. S. 6's 5-20, the former being at a discount of 5 per cent., and the latter at a premium of 8 per cent., and the interest on both payable in gold. His income from the two investments was \$1400 in gold. Find the amount (currency) invested in each kind of bonds.

25 5. Three workmen A, B, C, did a certain piece of work and were paid daily wages according to their several degrees of skill. A's efficiency was to B's as 4 to 3, and B's to C's as 6 to 5; A worked 5 days, B 6 days and C 8 days, and the whole amount paid for the work was $\$36\frac{1}{4}$. Find each man's rate of wages per day.

25 6. A merchant in Montreal owes another in Lisbon $1623\frac{3}{8}$ milrees, and he resolves to remit through London, Amsterdam and Paris: exchange between Montreal and London is at $9\frac{1}{2}$ per cent., between London and Amsterdam £1 sterling for $£1\frac{35}{39}$ Flemish, between Amsterdam and Paris £1 Flemish per 13 francs, and between Paris and Lisbon 3 francs per 450 rees: if the expenses of this circuitous course be $2\frac{1}{2}$ per cent., what will it cost the Montreal merchant to settle his Lisbon account? (1000 rees = 1 milree.)

20 7. I bought a hind quarter and a fore quarter of beef weighing together 252 lbs.; I paid $7\frac{1}{4}$ cents. a pound for the hind quarter and $5\frac{1}{2}$ cents. a pound for the fore quarter, and found that I had paid $17\frac{1}{2}$ cents on the whole more than if I had bought both quarters at $6\frac{3}{8}$ cents per pound: find the weight of each quarter.

25 8. A person bought a piece of land for \$1000, to be paid for in five years with interest at 10 per cent.; he was allowed a choice of two modes of payment, (1) he could leave the principal unpaid till the end of the five years, paying the interest due annually; (2) he could pay \$200 of the principal each year together with the accrued interest: money being worth 10 per cent. compound interest, determine whether one of these modes was more profitable than the other, and how much his land ultimately cost him.

25 9. A merchant bought 400 lbs. of Tea and 1600 lbs. of Sugar, the cost of the latter per pound being $16\frac{2}{3}$ per cent. that of the former; he sold the tea at a profit of $33\frac{1}{3}$ per cent., and the sugar at a loss of 20 per cent., gaining however, on the whole \$60: find his buying prices and his selling prices.

15 10. (*a*) Two Towers 40 feet and 50 feet high respectively, are standing in the same horizontal plane 120 feet apart; how far from each tower is that point in the line joining their bases, which is equally distant from their summits.

15 (*b*) Two adjacent sides of a parallelogram are 25 feet and 35 feet respectively, and one of the diagonals is $10\sqrt{12}$; find the other diagonal.

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2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 22.

GEOGRAPHY.

Time—Two Hours.

Value.	
15	1. Discuss minutely the causes which produce variation of climate.
8	2. Show by a diagram that neither the sun nor the moon can be eclipsed when the latter is in her quarters.
14	3. Account for the formation of clouds, rain, snow, hail, glaciers, springs, dew.
15	4. Describe the principal water-sheds of Europe, and give the rivers on each slope.
15	5. Classify the States of the American Union on the basis of agricultural products.
20	6. Name the principal rivers of Ontario and Quebec, tell where they empty, and mention the chief towns or cities on their banks.
12	7. Describe the river systems of Asia.
13	8. Name and locate the colonies of France.
10	9. Discuss the natural commercial advantages of Europe.
28	10. Draw an outline map of the British Islands, and locate Limerick, Donegal, Inverness, Ayr, Perth, Southampton, Holyhead, Hull; Rivers Bann, Barrow, Tay, Clyde, Severn, and Humber with its tributaries.
150	

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 23.

ENGLISH COMPOSITION.

TIME—ONE HOUR AND A QUARTER.

The candidates may select any one of the following subjects :—

The Centennial Exhibition.

The Progress of Canada.

"Man never is, but always to be blest."

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2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 24.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

Values,

35 1. Divide the following passage into propositions; state their several relations to one another, and give the full analysis of each proposition:—

> "*What* is this life to me? not *worth* a *thought:*
> *Or, if* it be esteemed, *'tis that* I lose it
> To win a better; *even* thy malice serves
> To me *but* as a *ladder* to *mount* up
> To such a height of happiness, *where* I shall
> Look down with scorn on thee and on the world;
> Where, *circled* with true pleasures, placed above
> The reach of death or time, 'twill be my glory
> *To think* at *what* an easy price I bought *it.*"
> —MASSINGER.

14 2. What do you understand by "Gender" in Grammar? Show that your definition applies to each of these words:—Lady, Seamstress, Man-servant, Testatrix, Mistress, Heroine, Margravine.

15 3. Give rules for the right use of the Subjunctive Mood, with examples.

24 4. Criticize the syntax of the following sentences, suggesting corrections where necessary:—

(*a*) Whom say ye that I am?

(*b*) From whence comes he?

(*c*) Whom the gods love die young.

(*d*) And many a holy text around she strews
That teach the rustic moralist to die.

(*e*) "Neither riches or beauty furnish solid peace and contentment."

(*f*) "Three months' notice are required previous to a pupil leaving the school."

(*g*) "If I were he, I would take more care for the future."

(*h*) "The atrocious crime of being a young man I shall neither attempt to palliate nor deny."

20 5. Convert the following adjectives by the help of prefixes or suffixes into verbs:—Large, Just, Humble, Strong;

and convert the following verbs into nouns:—
Weave, Compel, Receive, Dig, Think; and explain the law which governs each change.

13 6. What parts of speech perform a double function? Give full explanatory examples.

14 7. Write the past tense, present participle, and past participle of flow, fly, singe, dye, loose, lay, bear.

16 8. Give accurate rules for the use of *shall* and *will*.

20 9. Give adjectives, formed from Latin or Greek roots, corresponding to the English nouns brother, forest, breath, beginning, husband, cloud, leg, eye, hand, rule.

24 10. Trace the following words to Latin or Greek roots:—Venison, Sample, Maintain, Livery, Human Hermit, Sarcophagus, Volume, Tautology, Technical, Phylactery, Blasphemy.

30 11. Parse the italicized words in the passage given for analysis.

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2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 25.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS.

Value.

15 1. To what extent and in what way should a teacher render assistance to pupils?

20 2. Explain your method of teaching Grammar and Composition together to a 2nd or 3rd class.

20 3. "In imparting instruction the teacher should proceed from the known to the unknown." Show by examples how this rule should be observed in applying the principles of Simple Reduction to Reduction of Fractions.

15 4. What means would you adopt to prevent or check irregularity of attendance?

15 5. What are the most important points to be observed in the organization of a School?

15 6. "The work of *instruction* may be temporary, but the results of *education* must be permanent." Discuss this.

15 7. Give the prescribed programme of studies for 1st., 2nd., 3rd. and 4th. classes in Public Schools.

10 8. What are the regulations relating (1) to the suspension, (2) to the expulsion of a pupil?

15 9. What registers are required in Public Schools? Give the use of each.

10 10. Define adequate school accommodation.

150

PROVINCE OF ONTARIO.

XAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

2nd and 3rd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

Nos. 26 and 39.

DICTATION AND READING.

N.B.—*This Paper is not to be shown to the Candidates.*

DICTATION.

Fourth Reader, page 238.—"The frescoes on the walls - - - - - Horace or Anacreon."

READING.

Fourth Reader, page 214.—"You are standing on - - - - - this fearful moment?"

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 27.

EUCLID.

TIME—THREE HOURS.

N.B.—*Algebraic symbols must not be used. Candidates who take Book II. will omit Questions* 1, 2, *and* 3, *marked* *.

Values.

16 *1. The angles at the base of an isosceles triangle are equal to one another; and if the equal sides be produced, the angles on the other side of the base shall be equal to one another.

3 Where does Euclid require the second part of this theorem?

16 *2. If two triangles have two sides of the one equal to two sides of the other, each to each, but the angle contained by two sides of one of them greater than the angle contained by the two sides equal to them, of the other, the base of that which has the greater angle shall be greater than the base of the other.

6 Why the restriction "Of the two sides DE, DF, let DE be the side which is not greater than the other"?

16 *3. If two triangles have two angles of the one equal to two angles of the other, each to each, and have also the sides adjacent to the equal angles in each, equal to one another, then shall the other sides be equal, each to each; and also the third angle of the one to the third angle of the other. (Prove by superposition.)

3 What propositions in Book I. are thus proved?

16 4. If a straight line fall upon two parallel straight lines, it makes the alternate angles equal to one another, and the exterior angle equal to the interior and opposite angle on the same side; and also the two interior angles on the same side together equal to two right angles.

8 What objections may be taken to the twelfth axiom?

2 What is its converse?

16 5. In any right-angled triangle, the square which is described on the side subtending the right angle is equal to the squares described on the sides which contain the right angle.

12 Prove also by dissection and superposition.

18 6. Draw through a given point between two straight lines not parallel a straight line which shall be bisected in that point.

18 7. The perpendiculars from the angles of a triangle on the opposite sides meet in a point.

20 8. Given the lengths of the lines drawn from the angles of a triangle to the points of bisection of the opposite sides, construct the triangle.

20 9. If a straight line be divided into two parts, the square on the whole line is equal to the squares on the parts, together with twice the rectangle contained by the parts.

20 10. In every triangle, the square on the side subtending an acute angle is less than the squares on the sides containing that angle by twice the rectangle contained by either of these sides, and the straight line intercepted between the perpendicular let fall on it from the opposite angle, and the acute angle.

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EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 28.

HISTORY.

TIME—TWO HOURS.

Values.

10 1. Tell the origin and course of the war in Canada closed by the Treaty of Ryswick.

13 2. Enumerate in order the Governors of Canada since 1840; and state the principal events of the Administration of Sir Edmund Head.

10 3. What were the chief features of the Feudal System?

12 4. State the events by which the component elements of the English nation became welded into one people.

12 5. Tell briefly what you know of Lambert Simnel and Perkin Warbeck.

20 6. Give some account of the Battle of Evesham, the Constitutions of Clarendon, the Siege of Londonderry, and the Siege of Sebastopol.

12 7. When did the following persons live, and for what are they famous:—Sir William Wallace, Lord Cobham, John Pym, Sir John Eliot, Sir Cloudesley Shovel, Sir Charles Napier?

16 8. State the geographical position of the following Battle-fields, and assign the proper dates:—Bannockburn, Flodden, Sedgemoor, Bothwell Bridge, Fontenoy, Blenheim, Salamanca, and Assaye.

15 9. Write short explanatory notes on

(*a*) The Clergy Reserves Act.

(*b*) The Habeas Corpus Act.

(*c*) The Bill of Rights.

15 10. State the origin, course, and results of the Peloponnesian War.

15 11. Tell concisely what you know of the career of Julius Cæsar.

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EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

BOOK-KEEPING.

TIME—ONE HOUR AND A QUARTER.

Value.

10 1. Which do you consider the more satisfactory system of Book-keeping, Single or Double Entry? Give your reasons in full.

15 2. Explain the following terms as used in Book-keeping: Bills Payable, Stock, Shipment, Consignment, Account Sales, Acceptance, Drawee, Protest.

25 3. Journalize the following. Give your rule, and show that it is satisfactory when applied to these particular entries:

(a) July 1st., 1876. I commence business investing as follows:—Cash $5,000, Mdse. $2,500, Wood for use in Store $100. I owe on a note, favor of John Thompson, dated June 1st., at 6 mos. $1,200, with one month's interest on same $8.

(b) Bought of John Jones Mdse. as per invoice $1,200. Gave in payment my note for $600 at 30 days. Balance on account.

(c) Rec'd. from Henry Kerr 100 Bbls. Flour invoiced at $8 per Bbl., to be sold on his account and risk, paid drayage, &c. by an order on W. Smith $40.

20 4. Give Day Book entries corresponding to the following Journal entries:

(a) Mdse. Dr.	250	00		
Bank “	100	00		
To John Walker.			350	00
(b) Bills Payable, Dr.	800	00		
To Bank			300	00
“ Wm. West			450	00
“ Discount			50	00
(c) Shipment to A. B. Dr.	1,600	00		
To Mdse			1,000	00
“ C. D.			500	00
“ Cash			100	00

30 5. Give Day Book entries corresponding to the following entries as found in Mdse. account, and close the account, given that $2,000 worth of Mdse. still remains unsold:

DR. MDSE. CR.

July	1	To Stock	3,000	00	July	1	By Cash	300	00
“	3	“ Sundries	540	00	“	3	“ Bills Payable	150	00
“	5	“ Bills Receivable	320	00	“	6	“ John Jones	1,200	00
“	8	“ Wm. Cooper	800	00	“	8	“ Shipment to A. B.	1,800	00
“	10	“ John Smith	410	00	“	9	“ Bills Receivable	1,500	00
					“	10	“ Bank	100	00

100

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2nd CLASS CERTIFICATES

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NATURAL PHILOSOPHY.

TIME—THREE HOURS.

Values.

15 1. What particulars are required to be known in order to specify a force? What are the conditions of equilibrium of three forces acting at a point? What of three forces acting on a rigid body?

18 2. Forces of 1 lb., 4 lbs., and 6 lbs. respectively act on a particle, the force of 4 lbs. being inclined at an angle of 60" to each of the others, find the magnitude and direction of their resultant.

9 3. *(a)* What is meant by the moment of a force with respect to a point? State the principle of moments.

18 *(b)* A uniform rod a foot of which weighs 3 lbs., rests on a fulcrum two feet from one end, what weight suspended from that end will keep it horizontal when the pressure on the fulcrum is 300 lbs?

18 4. A circular plate of two feet radius has a circular hole of eight inches radius cut in it, find the distance of the centre of gravity from the centre of the plate, if the centre of the plate and hole are twelve inches apart.

18 5. n cylinders of the same height h the radii of which are equal to r_1, r_2, r_3, - - - r_n respectively stand one upon another with their axes in the same straight line; find the height of their common centre of gravity above the base of the first.

10 6. Define mass, density, specific gravity. What is the relation among mass, volume, and density?

12 If the volume of fresh water at 60° F. be 1·00094 and that of sea water be 1·0017, the standard volumes being at 39·1° F., find the specific gravity of mid-Atlantic water at 39·1 F., given that it is 1·0262 at 60° F.

16 7. Describe the Air pump, giving the principles of its action.

16 8. Describe Bramah's hydrostatic press, giving the principles of its action.

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2nd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 31.

ALGEBRA.

TIME—TWO HOURS AND THREE QUARTERS.

Values. | No.

8 | 1. Divide $(1+m)\,x^3-(m+n)\,xy\,(x-y)-(n-1)\,y^3$ by x^2-xy+y^2.

7 | Show that $(a+a^{\frac{1}{3}}b^{\frac{1}{3}}+b)^3-(a-a^{\frac{1}{3}}b^{\frac{1}{3}}+b)^3$ is exactly divisible by $2a^{\frac{1}{3}}b^{\frac{1}{3}}$.

4, 4, 6 | 2. Resolve into factors $x^4+2xy(x^2-y^2)-y^4$,
$a^2(b-c)+b^2(c-a)+c^2(a-b)$, and $25\,x^4+5x^3-x-1$.

18 | 3. If x^3+px^2+qx+r is exactly divisible by x^2+mx+n, then $nq-n^2=rm$.

4, 6, 6 | 4. Prove that if m be a common measure of p and q it will also measure the difference of any multiples of p and q.

Find the G. C. M. of $x^4-px^3+(q-1)x^2+px-q$ and $x^4-qx^3+(p-1)x^2+qx-p$
and of $1+x^{\frac{1}{2}}+x+x^{\frac{3}{2}}$ and $2x+2x^{\frac{3}{2}}+3x^2+3x^{\frac{5}{2}}$.

7, 7 | 5. Prove the rule for multiplication of fractions.

Simplify $\dfrac{x^2-(y-z)^2}{(y+z)^2-x^2}\times\dfrac{y^2-(z-x)^2}{(z+x)^2-y^2}\times\dfrac{z^2-(x-y)^2}{(x+y)^2-z^2}$;

and $\dfrac{a}{a^2+b^2}-\dfrac{a}{a^2-b^2}+\dfrac{a^2}{(a-b)(a^2+b^2)}-\dfrac{2a^3-b^3-ab^3}{a^4-b^4}$

3, 3, 10 | 6. What is the distinction between an *identity* and an *equation?* If $x-a=y+b$, prove $x-b=y+a$.

Solve the equations $(2+x)(m-3)=-4-2mx$,

and $\dfrac{16x-13}{4x-3}+\dfrac{40x-43}{8x-9}=\dfrac{32x-30}{8x-7}+\dfrac{20x-24}{4x-5}$.

3, 3, 10 | 7. What are *simultaneous equations?* Explain why these must be given as many independent equations as there are unknown quantities involved. If there is a greater number of equations than unknown quantities, what is the inference?

Eliminate x and y from the equations $ax+by=c$, $a'x+b'y=c'$, $a''x+b''y=c''$.

10, 4 | 8. Solve the equations—

(1) $\sqrt[3]{n+x}+\sqrt[3]{n-x}=m$

(2) $3x+y+z=13$
$3y+z+x=15$
$3z=x+y=17$

14 | 9. A person has two kinds of foreign money; it takes a pieces of the first kind to make one £, and b pieces of the second kind: he is offered one £ for c pieces, how many pieces of each kind must be take?

15 | 10. A person starts to walk to a railway station four and a-half miles off, intending to arrive at a certain time; but after walking a mile and a half he is detained twenty minutes, in consequence of which he is obliged to walk a mile and a half an hour faster in order to reach the station at the appointed time. Find at what pace he started.

8 | 11. (*a*) If $\dfrac{a}{b}=\dfrac{c}{d}$ then will $\dfrac{a^4+c^4}{b^4+d^4}=\dfrac{a^2c^2}{b^2d^2}$.

8 | (*b*) Find by Horner's method of division the value of
$x^5+290x^4+279x^3-2892x^2-586x-312$ when $x=-289$.

8 | (*c*) Show without actual multiplication that
$(a+b+c)^3-(a+b+c)\,(a^2-ab+b^2-bc+c^2-ac)-3abc=3(a+b)(b+c)(c+a)$.

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No. 33.

ZOOLOGY, BOTANY AND AGRICULTURE.

(*Special Paper.*)

TIME—THREE HOURS.

Values.	
15	1. Give the names and the distinguishing characteristics of the sub-kingdoms generally adopted by modern zoologists.
15	2. Sketch the life-history of the Frog.
18	3. Explain the terms Notochord, Hetrocercal Tail, Ovoviviparous, Branchiate Vertebrates, Condyle, and Contractile Vesicle.
12	4. Tell what you know about the Ascidians, the Rhizopoda, and the Rasores.
20	5. Explain the terms Papilionaceous, Cruciferous, Silique and Syngenesious; and in each case name a family in the description of which the term under consideration may be properly applied.
14	6. Give the characters of the Rose family.
12	7. To what families do the Tomato, the Radish, the Beet, the Hop, the Onion, and Rice respectively belong?
14	8. Describe the various modes in which biennials store up nourishment during their first season.
16	9. Explain the origin of the soil.
16	10. Discuss the subject of the rotation of crops.
12	11. Explain the terms Alluvium, Argillaceous, Calcareous and Leguminous.
16	12. Write notes on the cultivation of the grasses.

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3rd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 34.

ARITHMETIC.

TIME — THREE HOURS.

Values.

20 1. Find what quantity must be added to $\left(\frac{1\frac{1}{2}\text{ of }3\frac{1}{3}}{3\frac{1}{2}\text{ of }2\frac{2}{3}}\text{ of }\frac{1\frac{3}{7}\text{ of }1\frac{1}{6}}{1\frac{2}{7}\text{ of }\frac{32\frac{2}{3}}{3\frac{1}{2}}}+\frac{2\frac{1}{8}\text{ of }6\frac{2}{3}}{3\frac{1}{3}\text{ of }4\frac{1}{2}}\right)$ to make it equal to

$$\left(\frac{1}{28\frac{2}{7}}\text{ of }3\frac{3}{4}\text{ of }3\frac{1}{7}\text{ of }1\frac{5}{7}+\frac{3}{8}\right)$$

20 2. Reduce to its simplest form $\frac{(\cdot075)^3+(\cdot025)^3}{(\cdot075)^2-(\cdot075)(\cdot025)+(\cdot025)^2}$; and divide $9\cdot\dot{1}704\dot{5}$ by $3\cdot\acute{3}\acute{6}$, giving the result to the end of the first period.

10 3. Express $\frac{3}{40}$ of 12*s.* 6*d.* + $\frac{4}{15}$ of 3 guineas + $\frac{5}{12}$ of £4 − $\frac{3}{70}$ of $2\frac{1}{3}$*d.*, as a fraction of £5.

20 4. A merchant marks his goods so that he may allow a discount of 5% and still make a profit of 15%: Find the marked price of broad cloth that cost him $3.80 a yard.

24 5. At an election in a constituency in which the number of voters was 1,800, the votes polled by the candidates were in the ratio of 7 to 5, and the successful candidate was elected by a majority of 240. Find the number that did not vote.

20 6. A rectangular plot of ground is 60 feet long and 50 ft. wide; one pathway is made surrounding the plot on the outside, and two others intersecting at right angles in the middle of the plot; if these pathways are 5 feet wide and cost $62\frac{1}{2}$ cents a square yard, find their entire cost.

28 7. A and B engaged in business, the former contributing $7,500, the latter $4,500. The gross receipts for the first year were $2,800, of which 5% was paid for insurance, and $14\frac{2}{7}$ % for other expenses; of the balance, B received a certain sum for managing the business, and the remainder was divided in proportion to the capital each invested: A's share was $1,250; find B's allowance as manager.

18 8. At what rate per cent, will $1,520 amount to $1,733.75 in $2\frac{1}{4}$ years? Find also in what time $33.40 will double itself at $6\frac{2}{3}$ per cent. per annum.

22 9. A drover bought 400 sheep at a certain price per head. He sold $\frac{3}{8}$ of them at a gain of 20%, $\frac{3}{10}$ of them at a gain of 15, and the remainder at a loss of 10%, gaining on the whole $217. How much did he pay for the 400 sheep?

18 10. If three horses are worth 7 cows, and 5 cows cost as much as 30 sheep, and 16 sheep cost $165; find the value of 12 horses.

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No. 35.

GEOGRAPHY.

TIME—TWO HOURS.

Values.

10 1. Define Ecliptic, Circle of Illumination, Orbit, Meridian, Zodiac, Fiord, Morass, Estuary, Delta, Frith.

10 2. Account for the position of the Tropics and Polar Circles.

10 3. Describe briefly the principal ocean currents.

10 4. Mention a few of the circumstances on which the climate of a country chiefly depends.

10 5. Name the tributaries, (1) of the St. Lawrence, (2) of the Ottawa.

10 6. Name the States, (1) along the west bank of the Mississippi, (2) along the east bank, with the Capital of each.

20 7. Name the Countries of Europe, with the Capital and Political Relation of each.

28 8. Locate definitely the following, and tell for what each is famous:—Philadelphia, Chicago, Quebec, Lyons, Canterbury, Leeds, Greenock, Galway, Toulon, Corunna, Heidelberg, Aleppo, Lucknow, Macassar.

17 9. Where are the following: Islands,—Santa Cruz, Barbadoes, Pitcairn, Jura. Capes,—Wrath, Palos, Bathurst, Amber. Rivers,—Senegal, Kistna, Moselle, Madeira. Bays,—All Saints, Hillsborough, Placentia, Naples, Zuider Zee.

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No. 36.

ENGLISH COMPOSITION.

TIME—ONE HOUR AND A QUARTER

Write a letter to a friend who wishes to know what he must do in order to prepare himself to become a Teacher.

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3rd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 37.

ENGLISH GRAMMAR AND ETYMOLOGY.

TIME—THREE HOURS.

Values.

15 1. What is meant by Inflection, Gender, Predicate, Complement, Interjection ?

19 2. Write the plural of pea, attorney, stratum, lens, focus, mussulman, Henry, sixpence, seraph, cameo, index, crisis; and the masculine or feminine form, as the case may be, of widow, czar, testator, witch, duke, sultan, earl.

30 3. Divide the following passage into propositions, stating their kind and their relation to one another; and analyse them :—

> " *When* we met with the incident, or heard the conversation, or saw the spectacle, or *felt* the emotion, which were the first causes or *occasions* of *some* of the chief permanent tendencies of future life, *how little* could we think that *long* afterwards we might be curiously and in vain desirous to investigate those tendencies *back* to their origin."

24 4. Parse the words printed in italics.

18 5. Explain the different uses of the objective case, giving an example of each.

12 6. What is the passive voice ? When may a verb in the passive voice be followed by the objective case ?

20 7. Write the past tense, present participle, and past participle of loose, bear, come, eat, flow, fly, go, dye, singe, die.

19 8. Shew the different ways in which the words "there," "it," and "but" are employed.

20 9. Write the Latin or Greek prefixes signifying aside, across, against, down, together, change, near to, with examples; and explain the meaning of all the prefixes and affixes in the passage for analysis.

23 10. Correct, where necessary, the spelling of the following words :—surplice, Febuary, sherriff, rodomontade, imbecillity, Hindostand, sirname, moneys, mischevious, maritime, Calvanism, envelope, delerious, superintendent, apostasy, extacy.

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No. 38.

EDUCATION AND SCHOOL LAW.

TIME—TWO HOURS.

Values.

15 1. What is comprehended under the general name of Education?

25 2. Show clearly the importance of the proper organization of the school to both teacher and pupils.

40 3. Make a time table for a school of 50 pupils, none being higher than the fourth class. Show (*a*) what portions of time per week you give to each subject, and (*b*) how you would keep all your pupils employed while each class is reciting.

20 4. What qualifications would you require in a good monitor? What are the law and regulations as to the appointment of monitors?

20 5. Write a letter to a Board of Trustees in answer to a request that you will inform them what furniture they will require for their new school-house (50 pupils).

30 6. Draw up a set of rules for—

(*a*) A monthly examination;

(*b*) The conduct of the pupils;

(*c*) The guidance of your assistant.

PROVINCE OF ONTARIO.

EXAMINATION OF PUBLIC SCHOOL TEACHERS, HELD UNDER THE REGULATIONS OF THE EDUCATION DEPARTMENT.

3rd CLASS CERTIFICATES.

COMMENCING 10th JULY, 1876.

No. 40.

HISTORY.

TIME—THREE HOURS.

Values.	
15	1. Distinguish the discoveries of Cabot and Cartier.
10	2. What were the chief features of the Feudal System.
20	3. Say briefly what you know of "Poyning's Act," "the Poor Laws," "the Exclusion Bill," "the Convention of Cintra," "the Revolution of 1688."
17	4. Name the chief events in the reign of Charles II.
15	5. Distinguish the wars of aggression and the wars of defence waged by the English nation. Give the reasons of your answer, in each case.
18	6. Under what circumstances were Ireland, Wales, and Scotland united with England? Give the dates.
16	7. When did these persons live, and for what are they famous:—Simon de Montfort, Geoffrey Chaucer, Lord Cobham, Sir Philip Sidney, Sir William Temple, Algernon Sidney, James, Duke of Monmouth, Richard Cobden?
24	8. State the geographical position of the following Battle-fields, and assign the proper dates:—Bannockburn, Flodden, Dunbar, Prestonpans, Fontenoy, Plassey, Salamanca, Brandywine, Alma. Write briefly the particulars of any *one* of these battles.
15	9. What is meant by the British Constitution? Write a short account of its leading features.

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ANSWERS TO 2ND CLASS NATURAL PHILOSOPHY.

2. $5\sqrt{3}$ lbs. The line of action of the resultant will be perpendicular to that of the 1 lb. force, and will therefore be equally inclined to the lines of action of the 6 lb. and the 4 lb. forces.

3. (*b.*) 240 lbs.

4. $1\frac{1}{2}$ inches.

5. $\frac{1}{2}\,\frac{r_1{}^2+3r_2{}^2+5r_3{}^2+\ldots\ldots(2n-1)\,r_n{}^2}{r_1{}^2+r_2{}^2+r_3{}^2+\ldots\ldots\ldots\ldots\ldots\ldots+r_n{}^2}\,h.$

6. 1·027.

ANSWERS, 2ND CLASS, ARITHMETIC.

No.
1. £2 0*s.* 6*d.*
2. $24\frac{55}{202}$ cents.
3. $451·20 ; $12.
4. $9,500 ; $16,200.
6. $2,190.
7. 116 lbs. ; 136 lbs.
8. Either method gives $1,610·51.
9. 75 cents ; $12\frac{1}{2}$ cents.
   $1·00 ; 10 cents.
10. (*a*) $63\frac{3}{4}$ feet.
    (*b*) 50 feet.

ANSWERS, 3RD CLASS, ARITHMETIC.

No.
1. $\frac{71}{1008}$.
2. ·1, $2\cdot\dot{7}263\dot{7}$.
3. $\frac{817}{1600}$.
4. $4 60.
5. 360.
6. $119·79 + .
7. $260.
8. $6\frac{1}{4}$, 15 years.
9. $2,480.
10. $1,732 50.

ANSWERS, ALGEBRA, 2ND CLASS.

Questions.	Answers.
1.	$(1+m)\,x-(1-n)\,y$.
2.	$(x-y)\,(x+y)^3, (a-b)(b-c)(c-a), (5x^2-1)\,(5x^2+x+1)$.
3.	Given in question.
4.	$x-1,\ 1+x^{\frac{1}{2}}$.
5.	$\left\{\begin{array}{c}\dfrac{(x+y-z)\,(x-y+z)\,(y+z-x)}{(x+y+z)^3}\\ \dfrac{1}{a-b}\end{array}\right.$
6.	$-\frac{2}{3}$, 1.
7.	$a''(b'c-bc')+b''(ac'-a'c)+c''(a'b-ab')=0$.
8.	$\left\{n^2-\left(\frac{m^3-2n}{3}\right)^3\right\}^{\frac{1}{2}}$; 2, 3, 4.
9.	$\frac{a\,(c-b)}{a-b},\ \frac{b\,(a-c)}{a-b}$.
10.	3 miles an hour.
11.	(*a*) Demonstration. (*b*) 2,000. (*c*) Demonstration.